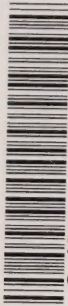
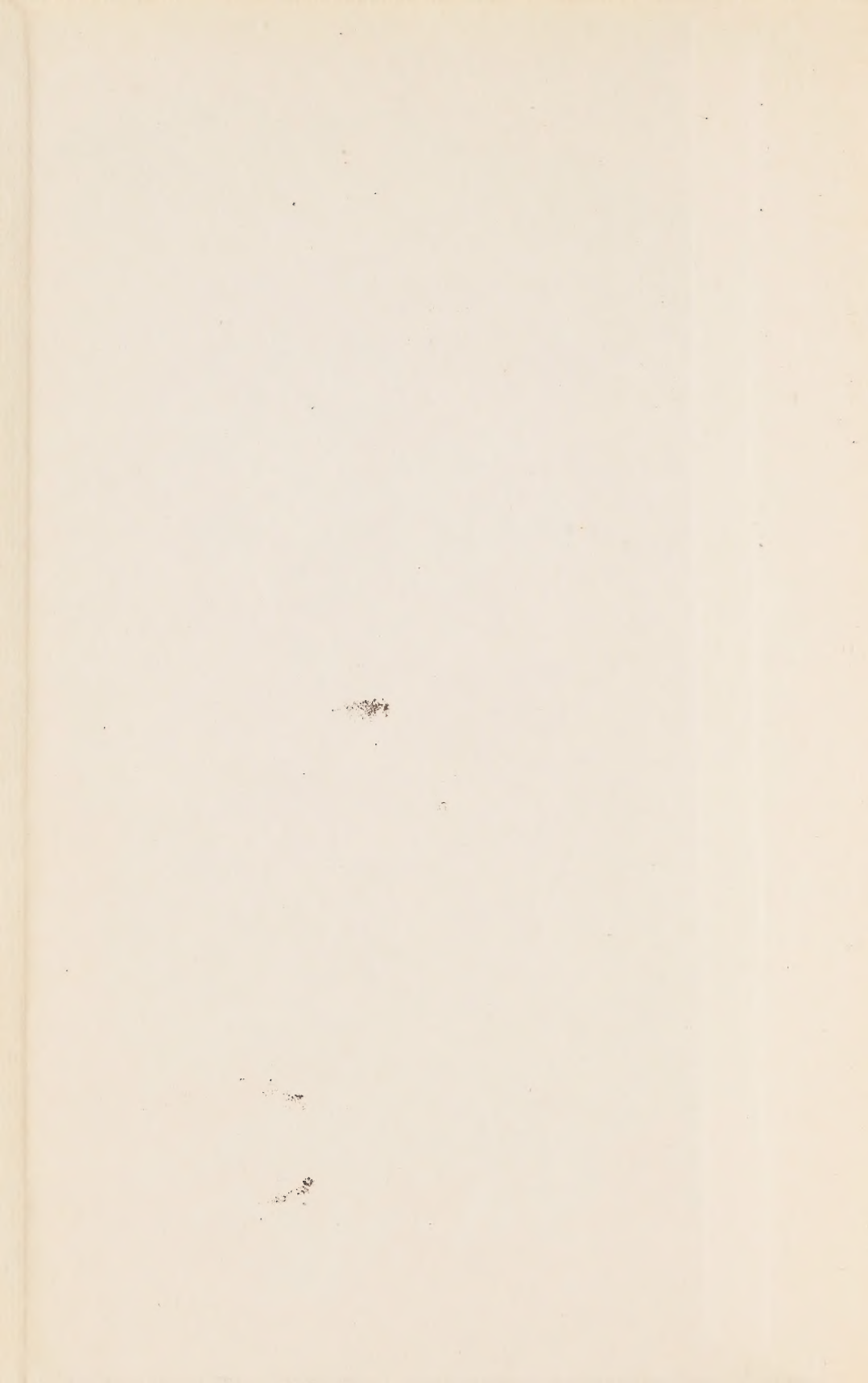



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DOMINION OF CANADA

TENTH ANNUAL REPORT

OF THE

DEPARTMENT OF FISHERIES

(Seventy-third Annual Fisheries Report
of the Dominion)

FOR THE YEAR

1939-40



OTTAWA

EDMOND CLOUTIER

PRINTER TO THE KING'S MOST EXCELLENT MAJESTY

1940

*To His Excellency Major General the Right Honourable Earl of Athlone, K.G.,
P.C., G.C.B., G.M.M.G., G.C.V.O., D.S.O., A.D.C., Governor General
and Commander-in-Chief of the Dominion of Canada.*

MAY IT PLEASE YOUR EXCELLENCY:

I have the honour to submit herewith, for the information of Your Excellency and the Parliament of Canada, the Tenth Annual Report of the Department of Fisheries, being the Seventy-third Annual Fisheries Report for the Dominion.

I have the honour to be,

Your Excellency's most obedient servant,

J. E. MICHAUD,
Minister of Fisheries.

DEPARTMENT OF FISHERIES,
OTTAWA, April 6, 1940.

DEPUTY MINISTER'S REPORT

To the Hon. J. E. MICHAUD, M.P.,
Minister of Fisheries.

SIR,—I have the honour to submit the Annual Report of the Department of Fisheries for the fiscal year 1939-40. It is the tenth report of the Department, but the seventy-third Annual Report on the fisheries of Canada. It includes reference to the results of commercial fishing operations in the Dominion in the calendar year 1939, foreign trade in products of the fisheries, and various other subjects related to the fishing industry and the work of the department.

Appendices to the report give information in detail with regard to different branches of departmental activities for the year. These appendices include:—

Reports of the Chief Supervisors of Fisheries.

Report on the Department's Fish Culture Work.

Report of the Fisheries Engineer.

Report on Oyster Culture.

Report on Canned Salmon Inspection and Research.

Departmental Financial Statement.

Statement showing the number of Lobster Fishing Licences, 1928-39.

Statement showing the numbers and kinds of Fishing Licences issued in 1938-39.

SUMMARIZED REVIEW OF FISHERIES RESULTS FOR THE CALENDAR YEAR 1939

During the calendar year 1939, Canada's commercial fishermen made landings of fish and shellfish totalling 10,681,318 hundredweights, and the catch had a marketed value of \$40,072,976. As compared with results for the previous calendar year, there was a decrease of slightly less than 60,000 hundredweights in catch and \$420,000 in marketed value. Sea fisheries production was valued at \$33,972,301, or 85 per cent of the total, and production from inland fisheries at \$6,100,675 or 15 per cent.

Both sea and inland landings were smaller than in 1938, though the decrease in neither case was great. Sea fishery landings totalling 9,789,270 hundredweights showed a reduction of 56,453 hundredweights as compared with 1938. Inland fisheries produced catches totalling 892,048 hundredweights, a decrease of about 3,380 hundredweights. Though catch was smaller Canada's 1939 sea fishery landings showed a greater marketed value than in 1938 or \$33,972,301 in all, an increase of \$198,153. On the other hand, production from the inland, or freshwater fisheries, totalling \$6,100,675 in marketed value, was worth some \$618,000 less than the 1938 catch. Four of the provinces (New Brunswick, Prince Edward Island, Quebec and Saskatchewan) had increases in marketed value to their credit, as will be seen by Table 1.

Major Fisheries.—Despite a reduction of nearly 265,000 hundredweights in catch and more than \$1,583,000 in marketed value, salmon continued to be Canada's major fishery product, representing 33 per cent of the total marketed

value of all the fish and shellfish landed during the year. The landings—salmon are taken on both coasts—were only a trifle below 1,501,750 hundredweights and the aggregate value of the catch on the market was \$13,409,292. Second only to salmon in point of dollar return from the fishery, lobsters were taken in a little greater quantity than in 1938, but weakening of prices in export markets before the war and the disruption of trade by the war brought lobster marketed value down to a total of \$3,782,325, as compared with a value of more than \$3,793,000 for the slightly smaller catch of the earlier year. Greatly increased landings made on the British Columbia coast during the year had the effect of moving sea herring into third place in marketed value, with cod dropping to fourth position. Combined herring catches on the two coasts advanced from 2,478,000 hundredweights, roundly stated, in 1938, to a catch of more than 4,303,000 hundredweights, and marketed value rose from \$2,185,769 to \$3,470,973. Cod landings showed a slight decrease in catch and value as compared with the preceding year; catch fell off from 1,702,000 hundredweights in 1938 to about 1,636,000 hundredweights, and marketed value from \$3,335,231 in 1938 to \$3,234,050. Whitefish was first in importance among freshwater fish, so far as dollar return is concerned, and seventh among all fish and shellfish. As marketed, the value of the whitefish catch, 164,700 hundredweights, or some 10,360 hundredweights more than in the year before, was \$1,722,342, an increase of nearly \$72,000. Other fish showing a value of more than a million dollars as marketed, included halibut, \$2,117,712, sardines, \$2,300,818, and haddock, \$1,357,064.

Employment and Capital Investment.—Investment representing boats, vessels, gear, equipment, and plant in use in the fisheries during the year was \$47,342,325, or \$1,219,117 less than in the year before. Of the total investment \$20,924,644 was represented by vessels, boats, nets, traps, piers, et cetera, in use in the sea fisheries, and \$4,917,711 by similar equipment in the inland fisheries. The remaining part of the total investment \$21,499,970, was in the canning and curing branch of the fisheries, with salmon canneries valued at \$11,566,687, or 54 per cent of the total for all establishments, the principal item.

The total number of persons directly employed in fishery operations during 1939 showed some decrease, totalling 83,776, or about 2,200 less than in 1938. Of the aggregate number, 68,958 were engaged in catching and landing fish and the others were employed in the canneries and processing plants. There were 55,201 fishermen engaged in the sea fisheries and 13,757 in the freshwater fisheries.

Marketed value of the 1939 production by provinces is shown below in Table I, with comparisons of values for the three preceding years. Table II shows the marketed value figures for the sea fisheries and freshwater fisheries, respectively, for 1939.

TABLE I
MARKETED VALUE BY PROVINCES

	1939	1938	1937	1936
	\$	\$	\$	\$
Nova Scotia.....	8,753,548	8,804,231	9,229,834	8,905,268
New Brunswick.....	5,082,393	3,996,064	4,447,688	4,399,735
Prince Edward Island.....	950,412	930,874	870,299	953,029
Quebec.....	2,010,953	1,957,279	1,892,036	2,108,404
Ontario.....	3,007,315	3,353,775	3,615,666	3,209,422
Manitoba.....	1,655,273	1,811,124	1,796,012	1,667,371
Saskatchewan.....	478,511	468,646	527,199	367,025
Alberta.....	430,724	492,943	433,354	309,882
British Columbia.....	17,698,980	18,672,750	16,155,439	17,231,534
Yukon.....	4,867	5,290	8,767	13,385
Totals.....	40,072,976	40,492,976	38,976,294	39,165,055

TABLE II

	Sea	Inland	Totals
	\$	\$	\$
Nova Scotia.....	8,753,548		8,753,548
New Brunswick.....	5,061,365	21,028	5,082,393
Prince Edward Island.....	950,412		950,412
Quebec.....	1,507,996	502,957	2,010,953
Ontario.....		3,007,315	3,007,315
Manitoba.....		1,655,273	1,655,273
Saskatchewan.....		478,511	478,511
Alberta.....		430,724	430,724
British Columbia.....	17,698,980		17,698,980
Yukon.....		4,867	4,867
Totals.....	33,972,301	6,100,675	40,072,976

SEA FISHERIES RESULTS

Figures showing, by provinces, total commercial production of sea fish and shellfish during each of the calendar years 1939 and 1938 are given in the following table:—

	1939	1938
	lbs.	lbs.
British Columbia.....	417,222,400	456,286,400
Quebec.....	90,923,800	86,507,800
New Brunswick.....	158,087,800	127,173,100
Prince Edward Island.....	30,566,100	29,420,400
Nova Scotia.....	282,126,900	285,184,600

Detailed reference to the results of the sea fisheries operations will be found in Appendix No. 1, made up of the respective reports of the department's eastern and western Chief Supervisors. Marked increase in the catch of sea herring was outstanding in sea fisheries operations during 1939. As shown in an earlier paragraph, landings of these fish, 3,303,200 hundredweights, showed an advance of some 825,200 hundredweights and marketed value rose from approximately \$2,185,800 in 1938 to a total of nearly \$3,471,000. Atlantic cod landings and British Columbia salmon landings both showed reduction in 1939 as compared with 1938 landings. There was a corresponding reduction in marketed value in both cases.

Mackerel catch, all taken on the Atlantic coast, showed an increase of over 80 per cent—520,651 hundredweights in 1939 as compared with 285,565 hundredweights in 1938. Sardine catch was also up greatly—317,085 barrels as against 184,450 barrels—but landings of haddock, a third fish taken only in Atlantic waters, decreased to 385,155 hundredweights in 1939 as against 393,589 hundredweights in 1938. In the case of the halibut fishery the year's returns showed improvement over those for 1938. With landings made on both Atlantic and Pacific coasts, total halibut catch, 184,734 hundredweights was about 22,200 hundredweights greater than was taken in 1938. Marketed value, \$2,117,712, showed a gain of \$328,300, roundly stated.

The Lobster Fishery.—Canada's lobster fishery, confined to waters of the three Maritime Provinces and the Province of Quebec, is the most important in the world but the operations of the lobster industry were less successful in 1939 than in some other recent years. Catch increased slightly but the lobster industry has been mainly dependent upon export markets and conditions in those markets, even before the outbreak of war, were less satisfactory than

they had been in 1938. Shipments of live lobsters—the trade in live lobsters is principally an export business with the United States—showed an increase during the year but the production and value of canned lobster fell off quite sharply; in total the value of lobster and lobster products marketed during the year was \$3,782,300, roundly stated, or about \$11,000 less than in 1938.

The tables immediately below give details as to production from the lobster fishery during 1939 and each of the three preceding years. It will be noted from the tables that so far as catch is concerned the figures for 1939 are larger than those for any of the other three years but on the marketed value side, the 1939 figures are the lowest for the four-year period.

CATCH

	1939		1938		1937		1936	
	Cwts.	Marketed Value	Cwts.	Marketed Value	Cwts.	Marketed Value	Cwts.	Marketed Value
		\$		\$		\$		\$
Nova Scotia.....	144,910	2,011,223	155,405	2,282,169	158,961	2,757,880	145,091	2,570,274
New Brunswick...	81,262	1,003,070	68,474	721,612	72,586	1,089,002	56,499	916,850
Prince Edward Island.....	69,977	589,669	71,213	606,134	58,238	538,792	59,286	614,789
Quebec, including Magdalen Islands.....	18,516	178,363	19,293	183,304	20,165	247,755	22,397	281,515
(Magdalen Islands).....	17,101	162,129	17,181	155,917	17,304	199,527	19,696	251,426
Totals.....	314,665	3,782,325	314,385	3,793,219	309,950	4,633,429	283,273	4,383,428

SHIPPED IN SHELL

Nova Scotia.....	82,082	1,346,007	82,530	1,423,138	89,904	1,816,045	73,158	1,535,573
New Brunswick...	31,258	440,939	18,554	264,267	23,528	422,708	19,750	375,899
Prince Edward Island.....	9,745	101,618	11,072	117,044	2,064	26,153	2,743	35,939
Quebec, including Magdalen Islands.....	6,978	65,208	6,435	59,829	8,057	101,623	7,134	86,276
(Magdalen Islands).....	5,808	51,457	4,839	38,485	6,058	64,148	5,842	72,068
Totals.....	130,063	1,953,772	118,591	1,864,278	123,553	2,366,529	102,785	2,033,687

CANNED

Nova Scotia.....	30,157	572,590	37,838	734,086	34,649	817,814	37,690	960,621
New Brunswick...	25,706	491,450	23,060	403,473	26,957	624,128	20,428	512,055
Prince Edward Island.....	24,616	474,676	24,625	474,397	20,952	497,846	22,345	563,286
Quebec, including Magdalen Islands.....	5,214	102,047	7,481	121,841	6,023	144,332	7,639	194,005
(Magdalen Islands).....	5,099	99,684	6,223	115,843	5,623	134,448	6,927	177,714
Totals.....	85,693	1,640,763	93,004	1,733,797	88,581	2,084,120	88,102	2,229,967

TOMALLEY

Nova Scotia.....	2,921	23,719	3,684	33,873	3,588	37,250	3,668	35,512
New Brunswick...	594	4,473	686	5,128	1,215	10,039	1,174	9,796
Prince Edward Island.....	1,435	12,975	1,559	14,198	1,155	11,935	1,499	15,564
Quebec, including Magdalen Islands.....	98	956	119	1,094	174	1,080	128	1,234
(Magdalen Islands).....	98	956	116	1,049	155	931	108	1,044
Totals.....	5,048	42,123	6,048	54,293	6,132	60,304	6,469	62,106

LOBSTER MEAT

	1939		1938		1937		1936	
	Cwts.	Marketed Value	Cwts.	Marketed Value	Cwts.	Marketed Value	Cwts.	Marketed Value
		\$		\$		\$		\$
Nova Scotia.....	1,166	68,907	1,131	91,072	1,149	86,771	535	38,568
New Brunswick....	1,534	66,208	974	48,744	1,215	10,039	382	19,100
Prince Edward Island.....	10	400	11	495	62	2,858		
Quebec, including Magdalen Islands.....	222	10,152	12	540	12	720		
(Magdalen Islands).....	219	10,032	12	540				
Totals.....	2,932	145,667	2,128	140,851	2,438	100,388	917	57,668

DRIED FISH PRODUCTION

The output of dried fish during 1939 was not as great as in 1938 but the position of those engaged in the industry was made somewhat less difficult than it otherwise would have been by the creation of the Salt Fish Board. Canada's production of dried salt fish (including boneless fish) is confined entirely to the Atlantic coast and during the year there was an output of 229,555 hundred-weights with a marketed value of a little more than \$1,074,200. Cod, haddock, hake and cusk, and pollock entered into the production. The tables following show figures of dried fish production, by provinces, for 1939 and 1938, respectively, and production of boneless fish:—

PRODUCTION OF DRIED FISH

	1939		1938	
	Cwts.	Marketed Value	Cwts.	Marketed Value
		\$		\$
Nova Scotia.....	128,045	489,560	187,635	709,022
New Brunswick.....	20,912	101,104	24,612	111,779
Prince Edward Island.....	963	3,614	1,361	4,772
Quebec.....	49,225	228,420	52,843	248,314
Totals.....	199,145	822,698	266,451	1,073,887

PRODUCTION OF BONELESS FISH

	Cwts.	Marketed Value	Cwts.	Marketed Value
		\$		\$
Nova Scotia.....	28,765	237,347	32,273	255,418
New Brunswick.....	853	7,103	205	1,699
Prince Edward Island.....	252	1,972	155	1,180
Quebec.....	540	5,126	967	7,084
Totals.....	30,410	251,548	33,600	265,381

INLAND FISHERIES

Saskatchewan alone, among the areas in which Canada's inland fisheries are carried on, showed an increase in the value of fisheries production in 1939 as compared with 1938. Saskatchewan's gain, however, was under \$10,000 and aggregate marketed value of fisheries output for the freshwater areas as a whole, \$6,100,675, was \$618,000 less, in round figures, than in 1938. The greatest decrease was shown in Ontario where there was a drop of \$346,000 in

marketed value; lessened catches of trout were responsible for over half the reduction. Trout catch, 50,758 hundredweights, showed a decrease of 9,647 hundredweights as compared with 1938, and declined about \$193,000 in marketed value.

The gain in Saskatchewan was \$9,865. In New Brunswick there was a decrease of \$3,400 in the marketed value of the freshwater catch and in Quebec a decline of some \$59,000. Manitoba's catch was down by \$156,000 in value, while Alberta's landings were worth some \$63,000 less than in 1938. There was a small decrease in the value of the catch in the Yukon but fisheries figures for the Territory are never large.

The following table shows the catch of the principal varieties of freshwater fish in 1939 and each of the three years preceding:—

	1939	1938	1937	1936
	cwt.	cwt.	cwt.	cwt.
Whitefish.....	164,619	154,244	173,675	144,603
Pickereel.....	120,509	128,812	143,020	145,635
Tullibee.....	69,893	57,932	55,966	59,265
Trout.....	62,833	72,555	70,588	72,825
Pike.....	56,483	62,283	51,320	54,370
Herring.....	61,329	55,700	50,236	50,919
Perch.....	32,528	43,067	34,672	31,090
Blue Pickerel.....	61,575	73,171	94,496	68,995

NOTE.—Practically all of the Dominion's freshwater fisheries are under provincial administration and most of the figures in the foregoing table come from provincial government sources.

FISHERIES EXPORT TRADE

Canada's export trade in fisheries products in 1939 reached the highest level in a decade. At \$29,641,000, roundly stated, it exceeded the business done in 1938 by nearly \$2,100,000.

The United States continued Canada's biggest fishery customer with purchases totalling \$13,661,000 in value, an increase of \$947,000, but exports to the United Kingdom, second great Canadian fishery market, showed the most gain, \$1,837,000. Business with Britain totalled \$8,718,000 as against \$6,881,000 in 1938.

Expanded food demands from Britain in the latter months of 1939, as a result of the war, were responsible in substantial measure for the increase in fishery product sales to the Old Country. War conditions had their effect on sales to other countries, too, but in this instance brought about a disruption of markets rather than an increased demand, and fishery exports to countries other than the United Kingdom and the United States, totalling some \$7,262,000, showed a drop of \$687,000 as compared with the previous year's business.

Given in round figures, total export sales, exports to the United States and the United Kingdom, and exports to other countries during 1938 and 1939, respectively, were as follows:—

	1939	1938
	\$	\$
Total Sales.....	29,641,000	27,543,000
Sales to United States.....	13,661,000	10,063,000
Sales to United Kingdom.....	8,718,000	6,880,000
Sales to Other Countries.....	7,261,000	7,949,000

Shown by classes of products, Canadian fisheries exports for 1939 and the preceding year, with round figures being used in all cases, were as given below:—

	1939	1938
	\$	\$
Fresh and Frozen Fish.....	12,309,000	11,344,000
Canned Fish.....	11,549,000	10,064,000
Salted, Dried, Pickled or Smoked Fish.....	3,884,000	3,885,000
Miscellaneous Fisheries Products.....	1,162,000	1,275,000
Fish and Whale Oils.....	737,000	975,000

As indicated in the preceding table, the major part of the total dollar increase was contributed by an advance in the canned fish sales, though fresh and frozen fish was the greatest single item of export in fisheries products and also showed a considerable increase. Sales of canned fish were about \$1,485,000 greater than those made in 1938, and sales of fresh and frozen fish advanced by more than \$964,000.

Lobsters, of which 10,792,000 pounds were exported alive, with the United States absorbing practically the entire export, brought the greatest return from a single species in the fresh and frozen classification, or \$2,011,000, but rising sales of fresh and frozen halibut and salmon played an important part in the gain shown and sales of fresh and frozen cod, haddock, hake, cusk and pollock were practically double those made in 1938.

A point of interest in the exports of 1939 was the marked increase of shipments of fresh and frozen fish to the Old Country. For instance, total exports of halibut, fresh and frozen, were 11,500,000 pounds with a value of \$1,203,000 as compared with 9,020,000 pounds, valued at \$910,000 in 1938; of the aggregate quantity shipped to external markets, the United Kingdom purchased 5,685,000 pounds as against purchases of 5,621,000 pounds made by the United States. Out of a total of 12,850,000 pounds of fresh and frozen salmon exported, the United Kingdom purchased 6,013,000 pounds and the United States 6,107,000 pounds.

Even more marked was the increase made during the year in shipments of cod, haddock, hake, cusk and pollock in fresh and frozen form, which totalled 13,100,000 pounds with a value of \$879,600. War conditions brought some increase in demand for these varieties from the United Kingdom and there were indications of a further expansion of market in that country. Of course, however, the United States was Canada's major customer for products in this particular group. The new tariff arrangements which came into effect in January, 1939, under the trade agreement made at the close of 1938, contributed to expanded sales across the border. United States purchases of fresh and frozen cod and haddock during the year amounted to 12,342,000 pounds, with a value of \$801,000, as against 7,075,000 pounds, worth \$444,000 in 1938.

Canned salmon was first in importance among products entering into the export business in the canned fish classification. In fact, canned salmon brought a greater marketed return than any other fishery product exported. Canned lobster ranked second in canned fishery exports from the dollar standpoint. Sardines continued in third place but a huge expansion in sales of canned sea herring during the year brought herring into fourth place, only a few dollars behind sardines in export value.

Shipments of canned herring were nearly three times as great as in 1938 and reached a record "high" of 9,026,000 pounds. Out of the exports of this commodity the United Kingdom purchased no less than 4,533,000 pounds whereas in 1938 shipments of canned herring to the Old Country were practically non-existent. Substantial quantities were also purchased by British South Africa and Australia.

As was the case with canned salmon, practically all the sea herring were shipped from British Columbia. The Atlantic Coast in turn supplied the lobster and sardine shipments.

Canned salmon exports amounted to more than 59,291,000 pounds in all, with a value of nearly \$8,628,000. Biggest buyers were the United Kingdom, Australia, France and British South Africa, with the Old Country leading the list and purchasing some 30,387,000 pounds or shipments worth \$5,517,000. Canned lobster exports dropped sharply, owing, mainly, to the ruling of the British Government which placed this product on the luxury list in the United Kingdom shortly after the outbreak of the war and so halted exports to Canada's major customer. Total 1939 export sales of canned lobsters, which in 1938 had reached 4,117,000 pounds, were only 3,374,000 pounds. Canned sardine sales showed an increase, reaching 8,705,000 pounds, valued at \$724,600, as against 7,126,000 pounds, valued at \$629,000, in the preceding year.

Sales of salted, dried, smoked and pickled fish showed very little change in comparison with export business in other recent years. Total value of exports in this class, \$11,549,000, dropped less than a thousand dollars below the 1938 trade.

Exports of oils produced as fisheries by-products were not so great as in 1938, though the business in herring oil showed a considerable increase and the sale of seal oil also rose sharply. Cessation of whaling operations in 1939 was an important factor in reducing total oil exportation. All told, the oils shipped out of the country during the year were valued at \$737,000, a decrease of about \$238,000 as compared with 1938 figures.

INCREASING CONSUMER DEMAND FOR FISH

Continuing in 1939-40 the same plan as had been followed in several preceding years, the department carried on a Dominion-wide publicity campaign designed to assist the fishermen by increasing Canadian use of fish foods. The same purpose was also furthered by continuation, and, indeed, expansion, of the departmental program under which fish cookery demonstrations are given by trained dietitians in the department's employ. During the year the lecturer-demonstrators did work in different parts of the country, though giving most attention to Central Canada since it is there that there is the greatest concentration of population and, therefore, the best opportunity of expanding the demand for fish. Linked up both with the publicity campaign and the demonstration program was the distribution of fish cook books to housewives and to pupils in household science schools. All told, the number of cook books distributed during the year ran into a good many thousand copies.

Slightly less than \$185,000 was expended in carrying on the publicity campaign within Canada. From the same appropriation voted by Parliament for the purpose of expanding the demand for products of Dominion fishermen, \$15,000 was transferred by the department to Great Britain for use in supplementing other advertising of Canadian canned salmon and lobster carried on in the "Canada Calling" campaign in the Old Country. (In addition to the general campaign in the domestic field there was also some special advertising of salt fish within Canada. The cost of this work, approximately \$20,000, was met from the parliamentary appropriation in aid of the salt fish industry.)

In the general campaign within the Dominion advertising space was taken in a large number of periodicals of many different classes, such as daily and weekly newspapers, national magazines, food trade papers, farm journals, and so on. Both English and French publications were used, as well as a selected number of papers printed in some other languages native to different groups of settlers from abroad. Supplementing the advertisements were numerous articles and photographs, widely published, which drew attention to Canadian fish foods, their preparation, uses and merits.

Use was also made of a motion picture, with sound and in colour, illustrative of the fishing industry and having reference to fish as a food. The picture was produced especially for the department. Both French and English editions were made. Under the title *Teeming Treasures*, the picture is being shown in many of the leading Canadian theatres and reports from theatre managers are that it has been well received by the public. It is expected to be useful, of course, for some time to come as an effective means of bringing Canada's fisheries and fish products to popular attention.

ASSISTING FISHERMEN BY DIRECT AID

Under a plan broadly similar to that followed in several earlier years direct financial aid was given during 1939-40 to over 15,500 fishermen and 33 associations of fishermen on the Atlantic Coast. In addition, help was given to several fishing communities in other ways, as, for example, in assisting the establishment of cold storage and fish processing plants. All told, the year's grants and loans to fishermen and fishermen's associations, plus the amount expended on miscellaneous fisheries aids in accordance with the plan, totalled \$569,500, roundly stated, and of this sum \$473,500, round figures again, was contributed by the department from an appropriation voted by Parliament "to enable aiding fishermen, groups of fishermen and others to establish or better establish themselves in the industry." The balance was contributed by Nova Scotia, Prince Edward Island and New Brunswick. As in other years, the plan of direct aid was operative on the Atlantic Coast only since the British Columbia authorities decided not to join in it.

In Nova Scotia loans were made to 2,260 individual fishermen and to 14 associations and, in addition, 61 boat-building loans, averaging \$400, were also made. The aid to individual fishermen included loans to 314 men who had lost their gear in especially disastrous storms which had swept the coast. Taken together, the various loans amounted to slightly less than \$152,900 and of this sum the department supplied a little more than \$102,800. Federal assistance totalling over \$51,800 was also given toward the establishment of cold storage plants in certain localities in the eastern part of Nova Scotia where facilities of the kind were needed to enable the fishermen to operate effectively and several thousand dollars were spent on wharf improvements in order to further the same purpose.

The number of New Brunswick fishermen receiving financial aid under the federal-provincial plan was 2,667, a good many of them being men whose equipment had been damaged or destroyed by some of the same storms which had wrought havoc in Nova Scotia. The amount of assistance given totalled a little more than \$49,500 and of this sum nearly \$34,300 came from the department's funds. With the approval of the department \$75,000 from the sum of \$100,000 granted to New Brunswick for the purpose of helping needy fishermen was applied as subsidy for a freezing and storage plant erected at Caraquet. The establishment of the plant was financed jointly by the provincial government and an important fish producing company which had not previously operated in that part of Canada. It is believed that it will be of a good deal of benefit to the fishermen of the district since it will give them a new outlet for their catches and enable them to enter into classes of operations which otherwise they could not carry on effectively.

Loans to Prince Edward Island fishermen numbered 1,328 and loans to associations of fishermen in the island 19. Certain expenditures were also made in the province to assist in providing or improving facilities for fish processing in certain areas where the fishermen were in need of such help. The aggregate amount of the loans and other expenditures was about \$80,700, with the department contributing \$50,000 and the province the remainder.

Outlays in Quebec, including administrative costs, were a trifle less than \$154,100, all met from the department's appropriation. Fifteen thousand dollars were used in assisting the development of a reduction plant in Saguenay county and the remaining amount, or nearly \$140,000, in supplying 9,284 needy fishermen with fishing equipment and material for the repair of fishing boats or engines.

INSTRUCTIONAL WORK AMONG FISHERMEN

During 1939, special work in adult education was conducted among the fishermen in Atlantic Coast areas. In addition to meeting the cost of this educational work in Nova Scotia, New Brunswick, Prince Edward Island and the Magdalen Islands, where the actual instruction was given by adult education specialists of St. Francis Xavier University, the department gave some financial assistance to similar activities on the Quebec mainland and in British Columbia. In Quebec the instruction was conducted by the High School of Fisheries, of Ste. Anne de la Pocatière, while in British Columbia it was in the hands of two workers trained in the St. Francis Xavier University methods but employed by the Extension Department of the University of British Columbia.

The program of adult education, designed to assist the fishermen by providing an opportunity for them to study their own problems and complete organization for joint action towards the solution of their difficulties, was begun in 1936-37, in northeastern New Brunswick, under arrangements made by the department with St. Francis Xavier University. Subsequently it was extended to the Magdalen Islands, the only part of Quebec where the fisheries are under federal administration, then to Prince Edward Island districts, and then to certain parts of Nova Scotia. Under its arrangements with the university, the department pays only the actual cost of the instructional program and designates the districts in which it is to be carried on.

Under the plan the fishermen are helped to organize and conduct study clubs, to form associations for joint action, and to affiliate with existing organizations such as the United Maritime Fishermen, where they desire to do so. Since the department has set the plan in motion a number of groups in the Atlantic areas have taken up co-operative lobster canning, co-operative marketing of smelts, and other similar lines of endeavour.

In 1939 educationalists engaged in this work in the Maritime Provinces and Magdalen Islands visited nearly 2,800 places, and addressed meetings with an aggregate attendance of almost 86,000. They took part in the formation of about 1,000 new study clubs, and also attended over 1,600 meetings of fishermen's organizations. In British Columbia the work was only in a preliminary stage, but over 5,500 people attended the meetings held by the instructors, and 100 study clubs were organized in the province. During the same period between 50 and 60 study clubs were organized by the instructors sent out by the Ste. Anne de la Pocatière school.

Roundly stated, the amount spent on this educational work during 1939-40 was \$46,000, divided as follows: Nova Scotia, \$15,000, New Brunswick, \$12,500, Prince Edward Island and Magdalen Islands, \$4,100, Quebec mainland, \$6,300, British Columbia, \$3,600, and \$4,400 expended in assisting young fishermen to attend extension courses.

Short courses for fishermen were given during the year by the Fisheries Research Board at the Fisheries Experimental Station, Halifax, and at the Gaspé Fisheries Experimental Station, Grand River, Quebec. These courses included instruction in fish processing, navigation, handling of motor engines, et cetera. Demonstrations of actual operations were supplemented by lectures designed to give the fishermen an idea of the principles underlying operating procedure. Lectures dealing with the habits of fish in the sea in relation to their capture were likewise given.

Instructional work was also carried out in the field by experts in pickling, production of boneless cod, and the preparation of dried fish in the Gaspé style. Work of this kind was done in numerous communities in which the fishermen had asked for such assistance.

Investigations and experiments were continued by the Fisheries Research Board in further effort to serve the interests of the fishermen and the fishing industry generally. As reference to this research work will be found in more or less detail in the board's annual report for the year it need not be dealt with here.

FISH CULTURE AND OYSTER CULTURE

Fish cultural operations in 1939 were carried on by the department in those provinces, namely, Nova Scotia, New Brunswick and Prince Edward Island, where the fisheries are entirely or to a large extent under federal administration. Thirteen main hatcheries, one subsidiary hatchery, six rearing stations, seven salmon-retaining ponds and several egg-collecting camps were operated. Only the more important freshwater and anadromous food and game fishes such as Atlantic and seago salmon, and speckled and rainbow trout were propagated. In addition over 1,000,000 sockeye salmon eyed eggs were planted in Hillier creek, tributary to Maggie Lake, Vancouver Island, in continuation of the stocking effort, resumed in 1937, to add these waters to the sockeye reproducing areas of the Barkley Sound district. The total output in 1939 was 34,253,330.

A detailed report on the fish culture operations for the calendar year 1939 is to be found in Appendix No. 2.

Appendix No. 4 contains a review, in more or less detail, of the year's work in connection with the further development of commercial oyster culture in Atlantic Coast districts in which oyster areas are under federal control. The review is well worth perusal and it is satisfactory to note that it records continued progress in establishing oyster farming on sound lines.

FISHING BOUNTY PAYMENTS

Payments totalling \$159,993.85 were made as fishing bounties during the year, under authority of "An Act to Encourage Development of Sea Fisheries and Building of Fishing Vessels."

The number of boat owners receiving bounty was 11,466 and the number of boat fishermen, 20,020; total bounty paid to this group was \$127,637.30. Payments to fishing vessels (646) and vessel fishermen (3,317) were \$32,356.55. By provinces the bounty payments were:—

Nova Scotia	\$78,210 80
Quebec	47,883 65
New Brunswick	19,972 95
Prince Edward Island	13,926 45

The basis of distribution for 1939 was as follows: (1) To owners of vessels entitled to receive bounty, \$1 per registered ton, payment to the owner of any one vessel not to exceed \$80; (2) to vessel fishermen entitled to receive bounty, \$6.20 each; (3) to owners of boats measuring not less than 12-foot keel, \$1 per boat; (4) to boat fishermen entitled to receive bounty, \$5.80 each.

Distribution of the bounty is shown by counties, for the four provinces affected, in the following table:—

1939-40

Province and County	Boats	Men	Amount	Vessels	Tons	Average Tons	Men	Amount	Total Amount
			\$ cts.					\$ cts.	\$ cts.
<i>Nova Scotia—</i>									
Annapolis.....	170	275	1,765 75						1,765 75
Antigonish.....	184	283	1,825 15						1,825 15
Cape Breton.....	338	556	3,575 50	39	556	14	144	1,448 80	5,024 30
Cumberland.....	2	2	13 60	1	19	19	1	25 20	38 80
Digby.....	329	575	3,664 00	20	273	13	58	632 60	4,296 60
Guysboro.....	616	1,024	6,554 90	27	361	13	85	888 00	7,442 90
Halifax.....	867	1,140	7,484 45	50	571	11	289	2,362 80	9,847 25
Inverness.....	255	630	3,909 00	3	34	11	16	133 20	4,042 20
Kings.....	54	68	448 40						448 40
Lunenburg.....	665	826	5,455 80	68	3,120	46	963	9,083 05	14,538 85
Pictou.....	29	48	307 90						307 90
Queens.....	195	314	2,016 20	18	227	12	80	720 60	2,736 80
Richmond.....	537	940	5,989 00	4	46	11	12	120 40	6,109 40
Shelburne.....	779	1,263	8,107 20	87	1,612	19	470	4,526 00	12,633 20
Victoria.....	265	391	2,532 80	9	123	13	32	322 10	2,854 90
Yarmouth.....	102	226	1,412 80	86	1,175	13	276	2,885 60	4,298 40
Totals.....	5,387	8,561	55,062 45	412	8,117	19	2,426	23,148 35	78,210 80
<i>New Brunswick—</i>									
Charlotte.....	233	453	2,847 00	6	70	11	18	181 60	3,028 60
Gloucester.....	495	1,016	6,389 10	155	2,792	18	611	6,580 20	12,969 30
Kent.....	234	402	2,565 60	9	97	11	27	264 40	2,830 00
Northumberland.....	19	37	233 60	11	115	11	18	226 60	460 20
Restigouche.....	3	3	20 40						20 40
Saint John.....	23	29	191 20						191 20
Westmoreland.....	37	75	473 25						473 25
Totals.....	1,049	2,015	12,720 15	181	3,074	17	674	7,252 80	19,972 95
<i>Prince Edward Island—</i>									
Kings.....	152	217	1,410 60	2	38	19	5	69 00	1,479 60
Prince.....	764	1,403	8,866 50	5	72	15	13	152 60	9,019 10
Queens.....	323	535	3,427 75						3,427 75
Totals.....	1,239	2,155	13,704 85	7	110	16	18	221 60	13,926 45
<i>Quebec—</i>									
Bonaventure.....	495	930	5,860 35	11	113	11	51	429 20	6,289 55
Caspe.....	2,364	4,611	29,170 30	35	387	11	148	1,304 60	30,474 90
Matane.....	143	250	1,593 75						1,593 75
Saguenay.....	789	1,498	9,525 45						9,525 45
Totals.....	3,791	7,289	46,149 85	46	500	11	199	1,733 80	47,883 65
Grand Totals.....	11,466	20,020	127,637 30	646	11,801	18	3,317	32,356 55	159,993 85

NOTE.—A number of "Late" claims amounting in all to \$2,130.70, which are included in this statement, are for the season of 1938. As the basis of distribution for 1938 differed from that of 1939, a number of figures in the "Amount" columns do not, as a result, balance with the number of claims paid.

PELAGIC SEALING RECEIPTS

Canada's net receipts in the fiscal year 1939-40 from the sale of fur seals taken under the Pelagic Sealing Treaty of 1911 were \$74,025.84. Of this amount \$41,929.19 was realized at fur seal auctions held in Montreal during the month of December, 1939, and \$29,387.53 from sales in London, England. The balance, \$2,709.12, was made up of payments from Japan, which under the treaty is required to pay to Canada a ten per cent share of the annual take of pelts secured on the Japanese rookeries. Receipts from Japan during 1939-40 represented returns from 420 skins, Canada's share of the take for two years, together with a small balance carried over from a previous year.

The Montreal auction of sealskins marked a new chapter in Canadian fur trade history for this was the first time any of the skins obtained by Canada under the treaty had been marketed by the Dominion in this country.

Under the treaty the capture of seals on the Pribilof rookeries is entirely in the hands of the United States Government, but Canada is entitled to fifteen per cent in number and value of the annual take of skins. Up to 1933 the Dominion had an arrangement with the Washington Government whereby Canada's share of skins from the Pribilof Islands went with the United States share to St. Louis for dressing and dyeing and was subsequently sold at semi-annual auctions at that point, under arrangements made by the United States authorities. Canada received fifteen per cent of the return from these sales after deduction of expenses.

In 1933 Canada arranged to receive its fifteen per cent share in skins and send them to London for processing and sale. Improved returns resulted and this plan was carried out for several years. Later, in 1937, however, market conditions in the Old Country became less satisfactory and an accumulation of skins resulted. As a consequence, it was decided to undertake marketing in Canada, with the result that the Montreal sales were inaugurated. A total of 3,124 pelts were disposed of in this way during the fiscal year. The Montreal sales were encouraging and there seems to be good reason to believe that Canadian marketing can be developed to absorb the annual number of skins received by the Dominion from the Pribilof operations, but pending the liquidation of the pelts already on hand from other seasons it was arranged that Canada's share of the skins taken on the Pribilof rookeries in 1939 should be disposed of through the United States Government, fifteen per cent of the net proceeds to revert to Canada in accordance with treaty terms.

During 1939 Canada's share of fur seal skins taken on the Pribilof rookeries was 9,103 skins. In 1938 the Canadian share was 8,277 skins. Under the measure of protection given them by the treaty, seal herds on the Pribilofs continue to increase and the total herd count, which was less than 150,000 animals at the time when the treaty came into force, is now estimated to be nearly 2,021,000.

PACIFIC SALMON COMMISSION

The season of 1939 was the second since organization of the work of the commission, known officially as the International Pacific Salmon Fisheries Commission and popularly known as the sockeye commission. Established in the fall of 1937, pursuant to the convention between Canada and the United States for the protection, preservation and extension of the sockeye salmon fisheries of the Fraser River system, the commission's organization and program were outlined and work was begun by the summer of 1938.

As is provided in the understandings attached to the convention.

"The Commission shall not promulgate or enforce regulations until the scientific investigations provided for in the convention have been made, covering two cycles of sockeye salmon runs, or eight years."

The principal concern of the commission during these first years has therefore been the scientific investigations. The program for these investigations was formulated, discussed and approved in 1938, as stated in the commission's report for that year. It was explained to both the Advisory Board, made up of representatives of the Pacific salmon industry of Canada and the United States, and to the members of the Scientific Council chosen by the commission.

Once established, the main features of the program must be continued from year to year until the necessary information is obtained. The sockeye of the Fraser River tends to return as a four-year-old, so that the runs occur in cycles of four years. Each year of the four is assumed to be more or less independent, very likely to be composed of different races occupying different spawning grounds. This is, of course, an approximation only to what actually happens, since nearly twenty per cent of Fraser sockeye are five years old and some straying from stream to stream may occur. Yet any program must be continued through more than four years in such form as to give a basis for distinction, study and comparison of all the constituent runs, each of which must recur within a four-year period. The initial investigations must, of course, be exploratory and preliminary, as they have been in 1938 and to some extent in 1939, so that the four-year cycle should be reckoned as beginning in the year when full application of a matured research program is made.

During 1939 the commission met on July 2, 3, and 4, when consideration was given to certain extensions of the existing program. One of these has to do with the study and removal of natural obstructions, another the study of possible dams and their effects, and a third the study of methods of assisting propagation in two selected areas used by the sockeye in its spawning. A mid-winter meeting of the commission held in Washington, D.C., January 30, and 31, and February 1, 1940, was for the purpose of reviewing the progress of the scientific investigations.

As in 1938, sockeye were tagged at Sooke, at various places in Puget Sound and the Gulf of Georgia and at Hell's Gate in Fraser River canyon in connection with study of the migration and habits of this species of salmon. At Sooke 1,051 fish were tagged, and fifty-one per cent recovered, as compared to forty-four per cent in 1938. As before, those tagged prior to the first week in July were returned from rivers other than the Fraser. In other tagging in salt water 6,152 fish were tagged, and sixty-five per cent recaptured, as compared to 2,587 tagged and forty-seven per cent recaptured in 1938. At Hell's Gate 4,344 fish were tagged and fifty-four per cent returned, as compared to 2,128 and twenty-seven per cent in 1938. The operations were continued over the full season, instead of about half the season as in 1938.

At Hell's Gate the time of passage and degree of obstruction to movement were studied. The run past that point was found to be divisible into sections, each bound for a different part of the Fraser.

Observers were again stationed at the canneries for sampling of the catch, recovery of tags and gathering of statistics. Others were stationed in the several sections of the Fraser watershed to estimate and take samples of the escapement, recover tags, survey the grounds and report on obstructions. As before there was the closest co-operation with the officers of the Dominion Department of Fisheries.

It was obvious that despite the utmost vigilance enumeration of the escapement by existing methods was not accurate nor complete. Accordingly the experiment with a relatively simple method tried at Cultus Lake and described in last year's report was this year extended to the Harrison-Birkenhead system, tributary to the Fraser. Traps and weirs were constructed and the runs there studied closely as a preliminary to a more extensive experiment. It became clear that here, as in the main river, there is a definite sequence of runs bound for different sections.

During the year a study was made of the races within the Fraser and in other rivers to which sockeye caught with Fraser River fish are bound. A great mass of data was collected and has now been analysed in part.

The experiments at Cultus Lake with methods of estimating escapement were carried further. At the same time the experiments originated by the Fisheries Research Board of Canada, on the control of predators and the factors influencing the survival of young, were continued.

The members of the commission are Messrs. A. L. Hager, Vancouver, Tom Reid, New Westminster, and A. J. Whitmore, of the Department of Fisheries, Ottawa, representing Canada, and E. W. Allen, Seattle, Washington, B. M. Brennan, Seattle, and C. E. Jackson, of the United States Bureau of Fisheries, Washington, D.C., representing the United States. Mr. Brennan is the chairman of the commission and Mr. Reid the secretary. The headquarters of the commission are at New Westminster.

PACIFIC HALIBUT COMMISSION

Under authority of the treaty of January 29, 1937, between Canada and the United States, the International Fisheries Commission continued during the past year the regulation of the Pacific halibut fishery and the execution of scientific investigations of the halibut and its fishery which form the basis for regulation.

The regulations governing halibut fishing in 1939 were essentially the same as those of 1938. Only a few minor changes were made to facilitate enforcement. The catch limits of 22,700,000 pounds for Area 2 and 25,300,000 pounds for Area 3 were retained. Closure of Area 2 by means of a last date of fishing was continued. The last date of validation of licences and the last date of fishing, by which Area 3 was closed in 1938, were supplemented by a last date of departure. The provision for the retention and landing of a limited proportion of halibut caught incidentally to fishing for other species with set lines was continued with minor qualifications.

The fishing season opened on April 1 as in the previous year. The catch limit for Area 2 was attained and Areas 1 and 2 were closed to halibut fishing at midnight of July 29, one day later than in 1938. Permits for the retention of halibut taken incidentally to fishing for other species in Areas 1 and 2 after closure to halibut fishing were granted until October 16 and valid until October 31. The validation of licences for fishing in Area 3 was discontinued on September 22, seven days earlier than in the previous year. Departure for fishing in Area 3 was prohibited after October 8 and Areas 3 and 4 were closed to all halibut fishing at midnight of October 28.

The landings of halibut during the year amounted to 50,737,249 pounds, of which 1,067,917 pounds were from Area 1, south of Willapa Harbor, Washington, 24,309,343 pounds from Area 2, between Willapa Harbor and Cape Spencer, Alaska, and 25,359,989 pounds from Area 3, between Cape Spencer and the Aleutian Islands. No fishing was done in Area 4, which includes the waters of Bering Sea. The Area 2 landings, including 372,943 pounds taken under permits while fishing for other species after the closure of that area, exceeded the quota by 1,609,343 pounds.

Both the size of the Canadian fleet and the Canadian share of the catch increased during the year. Twelve more Canadian vessels and seventy-seven additional fishermen engaged in the fishery and shared in the catch. The

Canadian fleet landed 45 per cent of the Area 2 catch and 10 per cent of the Area 3 catch in 1939, as compared to 41 per cent and 10 per cent, respectively, in 1938. The total catch landed by this larger fleet was the greatest taken by the Canadian halibut fleet since 1914.

The commission continued to maintain the close contact with the fishing industry, which has contributed largely to the commission's success. Informal meetings were held with various groups of fishermen. The annual meeting with the Conference Board, composed of representatives of the fishing fleets in the different ports, was held at Seattle on December 13. At these meetings the progress of the commission's investigations and the results achieved by its regulations were explained and suggestions of the fishermen relating to regulation were discussed.

Sittings of the commission were held at Seattle on July 7 and December 12, 13 and 14. During the latter, L. W. Patmore was elected chairman and Edward W. Allen elected secretary for the ensuing biennium.

Scientific investigations were pursued where necessary for the purposes of the treaty. They included the collection and analysis of the current statistical and biological data whereby the success of regulation can be determined and on which continued intelligent control of the fishery must be based. The collection of biological data made necessary the operation of vessels.

The halibut schooner *Tordenskjold* was chartered in December, 1939, to tag halibut and carry on associated studies off the coasts of British Columbia and southeastern Alaska. Working with a crew of Canadian fishermen, 337 fish were tagged in the vicinity of Cape St. James during the first trip which was completed before the end of the year. From all halibut unsuitable for tagging, length measurements, sex and date of maturity data, and materials for the determination of fecundity and age were obtained.

The tagging and associated investigations will contribute much needed information concerning the adult populations on the banks of that region. They will yield information regarding the migrations and interrelationships of the populations, the rate at which the halibut are removed by the fishery, the size and age at maturity, fecundity and rate of growth.

Study of the changes taking place in the composition of the stocks of marketable halibut as a result of regulation was continued. Approximately 68,000 fish landed at Seattle from different banks were measured. Of these, 39,000 were from banks off British Columbia in Area 2 and 29,000 from western banks in Area 3. Materials for the study of age composition were taken at the same time. A preliminary analysis of results for Area 2 failed for the second successive year to show any increase in the average size of the fish or in the proportion of larger and therefore mature fish.

The condition of the stocks of halibut, as indicated by the catch per unit of fishing effort, did not show the improvement that has characterized the catch of the previous 8 years. The catch per skate of gear in Area 2 fell from 68.8 pounds in 1938 to 60.6 pounds in 1939, a decrease of approximately 12 per cent, which brought it back to the 1937 level. The catch per skate in Area 3 was practically the same as in 1938, being 115.8 pounds in 1938 and 114.8 pounds in 1939, a change due probably to chance only. The lack of increase in this area is unimportant in view of the generally good condition of the Area 3 stock. However, although the abundance in Areas 2 and 3 was still 71 per cent

and 76 per cent higher, respectively, than in 1930, when the abundance of halibut reached the lowest point in the history of the fishery, the great decrease in abundance in Area 2 must be regarded with concern in view of the unsatisfactory condition of the spawning stock there.

The quantitative study of the production of spawn in the vicinity of Cape St. James was continued as a measure of the changes occurring in the spawning stock off the British Columbia coast. The plankton and hydrographic work begun in early December, 1938, on the chartered vessel *Eagle* was carried on until the middle of February of 1939. The same vessel was again chartered in December, 1939, for the same purpose and a like period. In the winter of 1938-39, 384 net hauls were taken at 142 stations to determine the abundance of eggs and larvae. Water samples and other hydrographic data were also taken at seventeen stations to obtain information about the hydrographic conditions, under which the eggs develop, and the currents in which they drift.

Analysis of the egg catches secured during the winter of 1938-39 and comparison of the results with those of previous years was carried out by approved methods. For the second consecutive year, the number of eggs produced showed a marked drop. Production in the winter of 1938-39 amounted to only 50 per cent of that of 1937-38 and to only 35 per cent of the 1936-37 production. Preliminary results indicate a still further reduction in the amount of spawn in the winter of 1939-40.

While some fluctuations in the annual production of eggs and young may be expected, the occurrence of such a continuous decline must be regarded seriously. In view of the decline in the catch per skate in Area 2, the decline in the production of eggs strongly indicates a reduction in the abundance of spawners that may be expected to have lasting and unfavourable effects upon the fishery when the young produced by these spawnings enter the fishery five to six years later.

In the light of the research that has been completed and is now in progress, it appears at the present time that the only satisfactory explanation of the unfavourable trend in the condition of the Area 2 stock must be the large amounts of halibut which are known to have been taken recently, both legally and illegally, in excess of the catch limit assigned to the area. It has become apparent that a sharp reduction of these excess catches will be necessary to assure the maintenance of past improvements and to make possible further improvements in the condition of the stock.

Personnel of the commission during the year was as follows:—

For Canada—Lewis W. Patmore, Victoria, and A. J. Whitmore, Department of Fisheries, Ottawa.

For United States—Edward W. Allen, Seattle, Washington, and Charles E. Jackson, Bureau of Fisheries, Washington, D.C. Mr. Jackson succeeded Frank T. Bell, formerly of the Bureau of Fisheries.

NORTH AMERICAN COUNCIL

The North American Council on Fishery Investigations has served for the interchange of information, the co-ordination of investigations and the solution of common problems concerning the fisheries of the western North Atlantic on the part of Canada, the United States, Newfoundland and France. A meeting

of the Council was being planned for September, 1939, to be held at Halifax, when the involvement of France in war with Germany made it impossible for her representative, Doctor Edouard LeDanois, to attend. In the circumstances it was decided to cancel the meeting. The Council activities for the year were confined to interviews and correspondence between Council members and advisers.

D. B. FINN,
Deputy Minister of Fisheries.

APPENDIX No. 1

ANNUAL REPORTS OF CHIEF SUPERVISORS OF FISHERIES
FOR THE YEAR 1939REPORT OF MAJOR D. H. SUTHERLAND, CHIEF SUPERVISOR OF
FISHERIES, EASTERN DIVISION

Total landings of all species of fish taken in the division during the year increased by over 30,674,300 pounds when compared with the year 1938. There was an increase of \$411,806 in value to the fishermen and an increase of \$1,107,439 in the total marketed value of all products.

The net increase in production is due to large landings in New Brunswick, where the increase in catch exceeded 30,917,800 pounds. Smaller increases occurred in Prince Edward Island and the Magdalen Islands, while the Nova Scotia catch decreased by approximately 3,057,700 pounds.

In the division as a whole there were increases in the quantity of herring, halibut, sardines, mackerel, smelts, swordfish and alewives among the fourteen chief varieties entering into the catch, and decreases in the case of cod, haddock, salmon, hake and cusk, scallops, oysters and pollock.

The total quantity of all fish and shellfish landed was 495,709,100 pounds with a landed value of \$8,423,372 as compared with 465,034,800 pounds with a landed value of \$8,011,566 in 1938.

The approximate total quantities and marketed values of the fish and shellfish produced in the division for the past six years were:—

	Production	Marketed Value
	lbs.	\$
1939.....	495,709,100	15,198,943
1938.....	465,034,800	14,091,504
1937.....	455,000,000	14,945,696
1936.....	472,000,000	14,764,797
1935.....	419,000,000	13,081,989
1934.....	422,000,000	12,786,565

THE LOBSTER FISHERY

It is encouraging to note that the lobster fishery production has continued to increase during the past three years. In 1939 increased catches occurred in the western district of Nova Scotia, and in both the eastern and northern districts of New Brunswick. Decreases in catch occurred in Cape Breton Island, where the catch was the smallest taken for a number of years, in the eastern section of the mainland of Nova Scotia, and in Prince Edward Island. The Magdalen Islands' catch was practically the same as that of the preceding year.

The total lobster catch for the division was 31,325,000 pounds, valued to the fishermen, as landed, at \$2,922,517, as compared with 31,227,300 pounds with a landed value of \$2,844,320 in 1938.

The number of fishermen engaged in this fishery was 18,038, or about 190 more than in the previous year.

The lobster fishery is the most important fishery in Eastern Canada, and the following table shows its trend during the past few years:

	Fishermen Licensed	Catch lbs.
1939	18,038	31,325,000
1938	17,847	31,225,300
1937	18,832	30,708,900
1936	18,551	28,057,200
1935	18,146	31,725,000
1934	17,968	35,658 800

In Nova Scotia during 1939 there was a decrease of 1,049,500 pounds in catch, with a decrease in landed value of \$122,239. In the Cape Breton Island district, where the greater portion of the decrease occurred, drift ice along the coast delayed fishing operations during the early part of the season.

The New Brunswick catch increased by 1,278,800 pounds. Larger landings were taken on both coasts, as compared with 1938 results, and the increased catch is reflected in the landed value, which shows an increase of \$195,544 over that of the previous year.

Landings in Prince Edward Island decreased by 123,600 pounds. During the early part of the spring season, drift ice and prevailing winds impeded fishing operations. During the late fishing season weather conditions were more favourable at the outset, and highly satisfactory catches were landed. Landings, however, fell off considerably as the season progressed. A steady market obtained throughout both seasons for shell lobsters and there was not the loss in live lobster shipments such as was experienced in 1938.

Little change occurred in the catch of the Magdalen Islands, but it was slightly below that of 1938.

A total of 191 canneries were operated in 1939, as compared with 213 in 1938. The total pack was 85,611½ cases of 48 pounds each, as compared with 91,746 cases in 1938, a decrease of 6,134½ cases.

A statement of catch, pack, shell shipments and meat is given on pages 8 and 9.

THE COD FISHERY

As a result of reduced landings in Cape Breton, western Nova Scotia and New Brunswick, the total catch of codfish in the division decreased by 12,033,500 pounds. On the mainland of Nova Scotia the catch decreased by about 11,800,000 pounds, the greater part of the reduction occurring in Lunenburg County, where there were six vessels less in the fishing fleet than in the previous year. Catches and values were well maintained in Prince Edward Island and the Magdalen Islands and show increases over those of last year.

The total quantity of codfish taken in the division during the year was 129,324,800 pounds with a landed value of \$1,575,408, as compared with 141,358,300 pounds and a landed value of \$1,712,723 in 1938. Marketed values were \$2,620,167 and \$2,803,351 respectively.

THE HADDOCK FISHERY

There was a decrease of 809,900 pounds in the year's catch of haddock. In Nova Scotia, where the major part of the production occurs, the landings increased in Cape Breton Island, but diminished on the eastern mainland and in the western part of the province. The catch for the Bay of Fundy area of New Brunswick increased over that of 1938.

The total quantity of haddock taken in the division was 38,512,500 pounds with a landed value of \$658,577, as compared with 39,322,400 pounds with a landed value of \$634,976 in 1938. Marketed values for the respective years were \$1,356,964 and \$1,361,216.

THE HERRING FISHERY

The catch of herring increased by over 4,300,000 pounds with landings increasing in the Nova Scotia mainland and in the Bay of Fundy area of New Brunswick but decreasing in the other districts. In the Bay of Fundy area catch increase was large. On the east coast of New Brunswick, where spring herring are used principally for bait and fertilizer, the smaller catch does not represent scarcity of fish as much as lessened fishing effort.

In Nova Scotia increased catches occurred in both the eastern and western sections of the mainland, with a decreased catch in Cape Breton Island.

THE HALIBUT FISHERY

The Halibut fishery, almost entirely confined to Nova Scotia, shows an increase of 798,800 pounds when compared with 1938. The bulk of the catch was landed at Lunenburg, Lockeport and Halifax. The landed value increased by approximately \$49,000.

THE SARDINE FISHERY

The sardine fishery is the most important of the Bay of Fundy fisheries and is confined to the New Brunswick coast waters of that district. During 1939 there was an increase of approximately 26,500,000 pounds in catch with an increase of approximately \$234,000 in value to the fishermen when compared with 1938 figures. Conditions in the sardine fishery were exceptionally good and a record pack of 539,486 cases was canned.

The production of sardines and the quantity canned in the past six years have been as follows:

—	Catch	Quantity Canned
	lbs.	cases
1939.....	63,389,400	539,486
1938.....	36,881,800	349,887
1937.....	31,768,400	423,043
1936.....	49,273,600	393,854
1935.....	37,499,800	338,436
1934.....	38,231,000	288,091

THE MACKEREL FISHERY

Unusually large quantities of mackerel were taken in Nova Scotia waters, resulting in an increase of over 23,700,000 pounds in the total catch for the division. Increased catches were also landed in Prince Edward Island and the Magdalen Islands but the New Brunswick catch was below that of 1938.

Total landings of mackerel were 51,796,700 pounds with a landed value of \$502,834, as compared with a catch of 28,081,900 pounds with a landed value of \$337,821 in 1938.

THE SMELT FISHERY

There was an increase of 179,700 pounds in the catch of smelts as compared with production in the previous year. On the eastern shore of New Brunswick, where the bulk of the catch was taken, the increase amounted to

over 142,000 pounds. Decreases in landings occurred in the western section of Nova Scotia and in the Magdalen Islands and Prince Edward Island. Standardized grading along the eastern shore of New Brunswick was responsible for the maintaining of a fairly good average throughout the season and prices at no time reached the low value of the previous season's catch.

The total smelt catch for the division was 6,244,400 pounds with a landed value of \$294,513, as compared with 6,064,700 pounds with a landed value of \$286,739 in 1938. Marketed values were \$414,510 and \$422,080, respectively.

THE SALMON FISHERY

The commercial catch of salmon in the division decreased by 305,300 pounds, the Nova Scotia mainland and Prince Edward Island being the only districts showing higher figures than in 1938. The greatest decline was on the eastern shore of New Brunswick. Both the drift-net and trap-net fisheries contributed to the decrease.

Total landing for the division were 1,559,500 pounds with a landed value of \$243,281, as compared with 1,864,800 pounds with a landed value of \$265,301 in 1938.

THE SCALLOP FISHERY

Scallop catch and value were about half as large as in the previous year. The fleet engaged was much smaller than in 1938 and this, combined with unfavourable weather, resulted in greatly decreased catches. Prices during the fall months were better than in the preceding year and more scallop meat was disposed of in the Canadian markets. The Nova Scotia fishery, which is centred at Digby, showed a decrease in production of 46,045 gallons (shelled), the equivalent of 23,022 barrels in the shell. A slight increase occurred in the Bay of Fundy district of New Brunswick.

The total catch for the division was 49,464 gallons (shelled) with a value to the fishermen of \$62,059 as compared with 95,190 gallons (shelled) with a landed value of \$123,008 in 1938.

OTHER FISHERIES

Landings of hake and cusk decreased by 5,077,300 pounds and decreased in landed value by \$24,832. The western section of Nova Scotia showed the greatest decrease in catch. In the Bay of Fundy district of New Brunswick the catch was about half that of the previous year. Landings of hake and cusk in the division totalled 20,995,000 pounds with a landed value of \$104,827, as compared with 26,072,300 pounds with a landed value of \$129,659 for 1938.

The catch of swordfish, made entirely in Nova Scotia, increased by 695,500 pounds with all sections of the province showing betterment. Total landing amounted to 1,788,400 pounds with a landed value of \$185,746, as compared with 1,092,900 pounds, with a landed value of \$101,529 during the preceding year.

Production of oysters from the public beds decreased by 3,181 barrels. In the Bras d'Or Lakes area of Nova Scotia there was a reduction of 464 barrels, while in the eastern mainland an increase of 178 barrels. On the eastern shore of New Brunswick the catch decreased by 2,607 barrels, owing to lack of demand during the early part of the season and unfavourable weather conditions during November when dealers could not obtain the supplies required to fill their orders. The Prince Edward Island catch shows a decrease of 288 barrels. The oyster farms of eastern Prince County are now producing practically the entire catch in this province and good returns are received by the exporters, due to

careful grading of the pack. The total landings for the division were 18,316 barrels, valued to the fishermen at \$81,992, as compared with 21,497 barrels valued at \$91,438 in 1938.

NOVA SCOTIA

Commercial production of all varieties of fish in Nova Scotia during 1939 amounted in all to 282,126,900 pounds or about 3,000,000 pounds less than in 1938. Returns to the fishermen decreased by approximately \$15,500 and the marketed value by approximately \$50,600.

In the western section of the province the aggregate landings decreased by over 10,000,000 pounds while the eastern mainland catch was greater by nearly 5,000,000 pounds than a year ago. Cape Breton Island catch increased by about 2,500,000 pounds. The largest single decrease occurred in the catch of cod—a reduction of over 12,000,000 pounds. Cod Landings in the eastern mainland were over 2,000,000 pounds above those of last year but in the western section of the province there was a decrease of over 14,000,000 pounds. Landings at Lunenburg and Lockport were considerably below those of 1938, with landings at Halifax increasing.

The haddock catch declined by 928,200 pounds following smaller landings in the mainland districts. Landings increased in Cape Breton Island when the larger vessels landed heavier catches at North Sydney during the latter part of the year.

A decrease of 1,049,500 pounds occurred in the catch of lobsters. As previously stated, the season was backward, with ice along the coast of Cape Breton and the eastern mainland until well after the commencement of the fishing season.

An unusually large increase will be noted in the catch of mackerel. Rise in landings was general throughout the province and amounted in all to over 21,000,000 pounds.

The halibut fishery increased by approximately 798,000 pounds—the result of more extensive operations of vessels in the fishery.

Increases will be noted in the catch of swordfish, herring, salmon and smelts. The catch of hake and cusk and pollock was below that of last year. The scallop fishery showed a further reduction with the catch being less than half that for the previous year.

The table below gives comparative figures for 1939 and 1938 for catch and value totals, as well as comparisons in the case of principal species entering into production, as well as similar information concerning the principal varieties.

1939

Total quantity of all fish landed.....	282,126,900 pounds
Landed value.....	\$ 5,308,016
Marketed value.....	\$ 8,753,548

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	14,491,000	1,648,483	2,011,223
Cod.....	106,783,400	1,373,510	2,305,083
Haddock.....	37,426,400	635,631	1,310,391
Mackerel.....	43,950,900	416,426	723,424
Halibut.....	4,752,900	410,852	596,834
Swordfish.....	1,788,400	185,746	243,783
Herring.....	26,235,000	174,773	405,055
Salmon.....	505,300	76,337	88,572
Hake and Cusk.....	13,510,400	70,895	117,852
Scallops (Gallons).....	45,955	57,840	74,774
Smelts.....	741,900	43,058	54,732
Pollock.....	7,320,100	40,490	86,932

1938

Total quantity of all fish landed.....	285,184,600 pounds
Landed value.....	\$ 5,323,582
Marketed value.....	\$ 8,804,231

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	15,540,500	1,770,722	2,282,169
Cod.....	119,243,800	1,507,424	2,496,631
Haddock.....	38,354,600	615,963	1,320,345
Mackerel.....	22,796,000	274,545	447,561
Halibut.....	3,954,400	362,203	499,175
Swordfish.....	1,092,900	101,529	132,763
Herring.....	25,565,400	167,807	407,146
Salmon.....	485,400	69,518	84,616
Hake and Cusk.....	16,587,000	85,999	195,349
Scallops (Gallons).....	92,000	119,109	135,460
Smelts.....	678,100	39,702	58,470
Pollock.....	8,189,200	43,695	93,761

NEW BRUNSWICK

The New Brunswick fisheries increased their production by nearly 31,000,000 pounds over that of 1938. Conditions in the sardine fishery were exceptionally good, both as regards the sale of fresh catches from the weirs and fish for the canning industry; the increase in catch amounted to well over 26,000,000 pounds, with an increase of approximately \$236,000 in value to the fishermen. The lobster catch increased by about 1,278,000 pounds with 248,800 pounds of this increase occurring in the Bay of Fundy district. The increase here is partially accounted for by the short spring fishing season that was given the Grand Manan fishermen. Increases were general over the north shore of New Brunswick, with the largest occurring in the fall fishing districts of Kent and Westmorland counties. The smelt fishery increased by 142,700 pounds with practically all of the catch being taken on the north shore. The total catch of herring for the province increased by 5,107,800 pounds. In the Bay of Fundy section there was an increase of 6,733,000 pounds. A much larger amount of smoked herring was put up at Grand Manan this year than during the previous year. Along the north shore, where the catch is used chiefly for bait and fertilizer, there was a decrease of 1,625,500 pounds.

The commercial catch of salmon decreased by 371,500 pounds. As already indicated, there was reduction in returns from both the drift-net and trap-net fisheries.

Cod landings declined by 1,743,000 pounds. In the Bay of Fundy area the landings were less than half as large as in the previous year, while on the north shore, particularly in Gloucester county, there was a further decrease in catch. The catches of shad, alewives and haddock were larger than in 1938. In the case of oysters, clams, and hake and cusk production decreased.

The total production for the province was 158,645,400 pounds, valued to the fishermen at \$2,186,270 and at \$5,082,393 as marketed; in 1938 the totals were 127,727,600 pounds, \$1,799,459 and \$3,996,064.

The commercial catch of the inland district, which is included in these figures but does not include the catches on the Northwest and Southwest Miramichi rivers, was 557,600 pounds, with a landed value of \$21,028 and a marketed value of \$21,028, as compared with a catch of 560,600 pounds with a landed value of \$24,465 and a marketed value of \$24,465 in 1938.

The table below gives a comparison of the total catch, landed and marketed values of all fish taken in New Brunswick during 1939, as compared with 1938, as well as similar information concerning the principal varieties.

1939

Total quantity of all fish landed.....	158,645,400 pounds
Landed value.....	\$ 2,186,270
Marketed value.....	\$ 5,082,393

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	8,126,200	692,864	1,003,070
Sardines.....	63,084,400	573,078	2,299,017
Smelts.....	4,503,600	211,722	304,961
Herring.....	47,839,300	198,989	578,943
Salmon.....	1,049,500	166,474	195,710
Cod.....	8,525,300	79,566	141,572
Shad.....	1,890,500	49,998	56,401
Alewives.....	7,344,000	39,812	80,591
Oysters.....	1,952,400	38,101	54,711
Clams.....	5,079,700	35,382	72,201
Haddock.....	1,025,300	22,210	45,099
Hake and Cusk.....	3,025,200	15,218	30,747

1938

Total quantity of all fish landed.....	127,727,600 pounds
Landed value.....	\$ 1,799,459
Marketed value.....	\$ 3,996,064

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	6,847,400	497,320	721,612
Sardines.....	36,127,800	336,826	1,389,195
Smelts.....	4,360,900	209,468	308,991
Herring.....	42,731,500	192,939	626,469
Salmon.....	1,421,000	204,045	258,994
Cod.....	10,268,300	103,548	167,322
Shad.....	1,338,700	37,861	42,307
Alewives.....	6,095,700	34,311	76,230
Oysters.....	2,473,800	45,966	76,512
Clams.....	5,591,900	36,513	94,580
Haddock.....	917,200	18,299	39,821
Hake and Cusk.....	4,569,800	23,913	36,898

PRINCE EDWARD ISLAND

Total production of fish in Prince Edward Island in 1939 was greater by 1,145,700 pounds than in 1938, owing to increases in the catches of cod, smelts and mackerel. There was an increase of \$33,980 in value to the fishermen and an increase of \$19,538 in the marketed value when compared with 1938.

Lobster landings decreased by 123,600 pounds but there was a gain of \$5,667 in the landed value. Spring lobster fishing did not commence until the second week of May, owing to the prevalence of drift ice around the Island. A steady market obtained throughout both seasons for lobsters in the shell and there was not the loss in live lobster shipments which was experienced in 1938.

Cod landings increased by 1,002,500 pounds and in landed value by \$12,383. Notable increases occurred in northern Queens and Kings counties. Prices were low, about the same as during 1938.

The catch of smelts increased by 10,500 pounds. The run of fish was small and low prices were obtained. Mackerel catch more than doubled; there was a sharp falling off in western Prince county but gains everywhere else. The greatest increase occurred in northern Queens county, where an unusually large number of fat fall mackerel were taken on the hook.

Oyster landings decreased by 57,600 pounds or 288 barrels in the shell; eastern Prince county is now producing practically the entire catch.

The table below gives a comparison of the total catch, landed and marketed values for 1939 as compared with 1938, as well as similar information touching the principal varieties:—

1939

Total quantity of all fish landed.....	30,566,100 pounds
Landed value.....	\$ 683,054
Marketed value.....	\$ 950,412

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	6,997,700	464,429	589,669
Cod.....	7,845,000	62,263	96,858
Smelts.....	971,300	38,082	52,995
Mackerel.....	2,536,600	35,178	52,981
Oysters.....	990,800	27,850	37,008
Herring.....	5,348,700	27,438	53,858
Hake and Cusk.....	4,459,400	18,714	40,658
Clams.....	598,000	2,990	14,373

1938

Total quantity of all fish landed.....	29,420,400
Landed value.....	\$ 649,074
Marketed value.....	\$ 930,874

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	7,121,300	458,762	606,134
Cod.....	6,842,500	49,880	76,415
Smelts.....	960,800	34,125	50,725
Mackerel.....	1,055,900	16,146	25,003
Oysters.....	1,048,400	29,232	39,193
Herring.....	5,605,600	29,174	57,728
Hake and Cusk.....	4,915,500	19,747	46,100
Clams.....	694,200	3,471	16,072

MAGDALEN ISLANDS

Production from the Magdalen Island fisheries was greater, in total, by 1,668,500 pounds than in 1938. The catch of lobsters decreased by 8,000 pounds but marketed value increased by over \$6,000. Cod landings increased by 1,167,400 pounds and by \$8,198 in value to the fishermen; increased landings were general throughout the islands and the bulk of the catch was pickle cured. The mackerel catch increased by 1,182,400 pounds and larger quantities of pickled mackerel and mackerel fillets were produced than in 1938. As a result of ice conditions the spring run of herring was late and fish were somewhat scarce at the beginning of the season. Herring catch decreased by 1,164,000 pounds.

The table below gives a comparison of the total catch, landed and marketed values as compared with 1938, as well as similar information in relation to the principal varieties.

1939

Total quantity of all fish landed.....	24,370,700 pounds
Landed value.....	\$ 246,032
Marketed value.....	\$ 412,590

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	1,710,100	116,741	162,129
Cod.....	6,171,100	60,069	76,654
Mackerel.....	4,623,900	42,214	88,275
Herring.....	11,168,200	18,325	73,473
Smelts.....	27,600	1,651	1,822
Clams.....	205,000	1,025	1,025

1938

Total quantity of all fish landed.....	22,702,200 pounds
Landed value.....	\$ 239,451
Marketed value.....	\$ 360,335

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	1,718,100	117,516	155,917
Cod.....	5,003,700	51,871	62,983
Mackerel.....	3,441,500	34,360	57,087
Herring.....	12,332,200	20,227	64,124
Smelts.....	64,900	3,444	3,894
Clams.....	123,000	615	745

SPORT FISHING

NOVA SCOTIA

General.—Water conditions during the year were unsatisfactory. With few exceptions the season was backward and cold, until the middle of June or first of July, and this condition was followed by a drought period for the remainder of the angling season. In some parts of the province the drought carried into the fall of the year and new low water levels were established. These conditions resulted in a reduced catch of both salmon and trout in the province as a whole.

Angling in Cape Breton.—Salmon angling was poorer in Cape Breton than during 1938. The water in the Margaree River was low, clear and unfavourable, except during the last two weeks of July and the last two weeks of the season, while on the North River St. Ann, Victoria County, low water prevailed during almost the entire season. The table below gives the number of salmon taken by angling during 1939, compared with 1938.

	1939	1938
Margaree River.....	314	488
North River St. Ann.....	302	349
Grand River.....	45	41
Baddeck River.....	1	26

A partial control of predatory birds and the continued stocking with larger sized fingerlings were doubtless factors contributing to a normal catch. From Victoria County waters increased catches were reported. Cape Breton County gave good early fishing with the usual number of larger fish. In Richmond County trout fishing was generally poorer than during previous years.

Deep Water Angling.—This type of fishing in Cape Breton waters was confined mostly to fishing for swordfish with rod and line off Louisburg. Landings, however, were poorer when compared with those of previous years, and this is attributed more to poor weather conditions than to a scarcity of broadbills.

Angling, Eastern Mainland.—In this section of the province the spring was late and weather cold until the middle of June, and from then on low to drought water conditions obtained. As a result of climatic conditions salmon angling was poorer than during 1938, and the catch for various rivers as shown below reflects the conditions existing:—

	1939	1938
<i>Halifax County—</i>		
Ingram River.....	166	174
Lawrencetown River.....		80
Musquodoboit River.....	46	100
Sheet Harbour River.....	20	40
Salmon River, Jeddore.....		8
Tangier River.....	51	114
West River, Sheet Harbour.....	51	38
East River, Sheet Harbour.....	19	16
Salmon River, Port Dufferin.....	45	64
Moser River.....	30	280
Nine Mile River.....	21	20
Osier River.....		1
Petpeswick River.....		8
Chezzetcook River.....		
Quoddy River.....	1	8
Kirby River.....	45	Unknown
<i>Guysborough County—</i>		
St. Mary's River.....	262	441
Gaspereau brook.....	7	24
Liscomb River.....	77	17
Ecum Secum River.....	30	48
Isaacs Harbour River.....	13	20
<i>Cumberland County—</i>		
Wallace River.....	127	70
River Philip.....	29	50

Early season trout fishing was somewhat curtailed by the late break-up of ice in lakes and streams, and later by low water conditions when fly fishing would ordinarily be carried on. As a result, the catch reported is less than during 1938.

Angling, Western Mainland.—Weather and water conditions along the Atlantic Coast of the western mainland seem to have been the best in the province for salmon fishing, and an increased catch is shown from rivers draining into the Atlantic.

On the Bay of Fundy side generally poor conditions prevailed and resulted in salmon catches by rod and line as shown in table below:—

	1939	1938
<i>Lunenburg County—</i>		
East River.....	32	59
Middle River.....	46	27
Gold River.....	110	73
LaHave River.....	250	125
Petite Riviere.....	150	60
<i>Queens County—</i>		
Medway River.....	412	312
Mersey River.....	510	278
<i>Shelburne County—</i>		
Clyde River.....	4	18
<i>Yarmouth County—</i>		
Tusket River.....	10	20
<i>Digby County—</i>		
Salmon River.....	32	38
<i>Annapolis County—</i>		
Lequille River.....	23	25
Round Hill River.....	47	100
Annapolis River.....	16	78
Nictaux River.....	10	37
<i>Kings County—</i>		
Gaspereau River.....	53	14

Trout fishing was reported to have been about the same as in previous years, notwithstanding somewhat unfavourable early season conditions. The best catches during the early season were obtained at the head-waters of the principal rivers.

Deep sea fishing for tuna was carried on at Wedgeport, Shelburne, Liverpool, Lunenburg and Chester. While facilities for this sport have greatly improved during the past few years, the catch during 1939 was not as great as in 1938. However, two world's tuna angling records were considered as having been established—first, for the largest tuna (weight, 890 pounds), and second, the landing of a tuna weighing 705 pounds on 24-thread line with a 16-ounce tip.

NEW BRUNSWICK

General.—Weather and water conditions varied somewhat in different parts of the province. On the south and east shore the season was backward, followed by low water conditions. Inland, water conditions while low offered good fishing, owing apparently, to intermittent rains. The catch of sport fish was generally greater than during 1938.

Bay of Fundy Area.—Salmon angling is not carried on to any great extent in this district. About the same number of fish were taken as during the previous year. The landlocked salmon catch in Chamecook Lakes remained about the same, 180 fish in 1939 as against 176 during 1938; the average size of the fish this year, however, was smaller than in previous years. Black bass fishing in Wheaton Lake was good during July, August, and the first two weeks in September. Trout fishing appears to have been as good if not better than in the preceding year. Sea fishing for pollock and sea bass is growing in popularity, and the waters of this area offer splendid opportunities for this sport.

Eastern District.—Salmon were late in arriving in this area, and it was not until the middle of June that they were taken by angling in appreciable numbers. Notwithstanding this, the catch by rod and line was sufficient to show an increase over the previous year. Restigouche County waters produced 4,354 salmon as against 3,634 during 1938. Jacquet River continued to show increased catches, 523 fish being landed as compared with 132 last year. This river is showing splendid results from systematic stocking and protection.

In Gloucester County there was a splendid increase in salmon angling catch, 1,165 fish being landed, compared with 460 during 1938. Salmon angling in Northumberland County within this district is confined principally to black salmon and 671 were taken during May, in comparison with 479 during 1938.

Trout fishing, on the whole, was better than in the previous year, although catches decreased in Kent and Westmorland Counties. For purposes of comparison the catch of trout by counties for 1939 and 1938 is given below:—

	1939	1938
Restigouche County.....	13,860	9,860
Gloucester County (Chaleur shore).....	20,835	12,355
Gloucester County (east shore).....	6,875	10,213
Northumberland County.....	5,594	5,448
Kent County.....	4,865	5,035
Westmorland County.....	2,710	3,380

Inland District.—Salmon water conditions were fairly satisfactory during the entire season. Although the water was low during the summer months rains falling inland caused a temporary rise in the Miramichi system, resulting in good salmon fishing. Water conditions in the St. John River system remained fairly normal on the main river, due to heavy rainfall in Quebec. On the tributaries of the St. John water conditions were low.

The following is a comparative table of the number of salmon and grilse taken on the St. John and Miramichi River systems by rod and line for 1939, compared with 1938.

	1939		1938	
	Salmon	Grilse	Salmon	Grilse
St. John River system.....	715	665	1,146	238
Miramichi River system.....	6,507	9,378	8,253	9,549

For black salmon fishing, 451 permits were issued, as against 356 during 1938. Had the season not been backward, it seems certain that the increase this year would have been still greater. This sport fishery is definitely increasing in favour each year.

Angling for bright salmon on the Miramichi system produced 3,486 salmon and 8,263 grilse; in 1938 the numbers were 3,250 salmon and 7,591 grilse. On the St. John River the catch for 1939 was 703 salmon and 665 grilse, as against 1,112 salmon and 216 grilse caught during the previous year. It will be noted that while the catch of salmon fell off the number of grilse landed increased.

The water of the Nashwaak River was very low all season, and little fishing was done on the river compared with previous years.

On the Tobique, fewer fish were taken than in the preceding year: salmon, 511 and grilse, 455, in 1939, compared with salmon, 806, and grilse 113, in 1938. While total catch fell off in 1939 it will be noted that there was an increase in the number of grilse captured.

Spawning conditions on the Miramichi system appeared satisfactory. The run late in the season appeared heavy. On the St. John system no appreciable increase of spawning salmon was noticeable; in fact, on the Tobique, where a survey was made, fewer fish were showing.

Prince Edward Island

General.—Water conditions in ponds and brooks of the island were similar to those obtaining in Nova Scotia, being only fairly satisfactory during the early part of the season, with low to drought conditions during the summer months. In many districts, streams were reported to have wholly dried up, and as a result there must have been a considerable loss of fish.

Prince County.—Early season fishing was good, but fell off considerably later in the season when the water became low and warm.

Northern Queens County.—There was good fishing during April and May, with landings dropping off towards the latter part of the season when high temperatures prevailed. In Gurney's and Winter Rivers exceptionally good fishing obtained with good catches of large sea trout being taken in the former river during July.

Southern Queens and Kings.—As in the other counties, good to fair fishing obtained during the early part of the season, but as the water became warm catches fell off considerably and fishing generally was not as good as in former years.

Northern Kings County.—Good trout fishing obtained at Fortune River, Big Pond and East Lake during May and the first of June, but after that angling was somewhat discouraging. The salmon catch in the trap at Morell River amounted to a total of 500 fish, 337 males and 163 females. A proportion of these fish were stripped, while the others were liberated unstripped. The number of salmon taken in this trap was slightly in excess of that handled during 1938.

FISHERIES PROTECTION SERVICE

The Fishery Protection vessels *Arras* and *Arleux* were actively engaged in fisheries protection duties in the territorial waters of the province, rendering assistance to vessels and boats in distress, and breaking ice in harbours to release fishing boats to enable them to proceed to and from the fishing grounds. This work was successfully carried out by the protection vessels until the later part of the year.

The *Arras*, at the opening of the season, was engaged in the Canso, Petit de Grat and Arichat area as a mother ship to the fishing fleets of those ports. While engaged in these duties the ship towed a disabled Canso fishing vessel back to port. From January 18 to 23 the *Arras* was on loan to the Fisheries Research Board and was used on biological work along the fishing banks off the Nova Scotia coast from Chedabucto Bay to Shelburne. From January 24 to March 14 the ship was engaged in patrolling in the vicinity of Shelburne and Cape Sable as a safeguard against infringements of the lobster fishing regulations, in protecting territorial waters, and in breaking ice and releasing vessels. From March 15 to April 17 the *Arras* was required in the Lockeport area as mother ship to the Lockeport fishing fleet. The ship was laid up at Yarmouth for annual overhaul from April 22 to May 30; patrol was then resumed between Yarmouth and Halifax. The *Arras* was again detailed for work with the fishing fleet on the Grand Banks during the summer months, and left Halifax on June 18, arriving at Burin, Newfoundland, on June 20. While on the Grand

Banks weather conditions, bait and ice reports, etc., were broadcast from the ship daily to the fleet. Medical services as required were rendered by the ship's doctor to members of the crews of the fishing vessels.

With reference to the work of the *Arras* on the banks, Captain Cousins commented as follows: "During the summer season 22 Lunenburg vessels operated on the Grand Banks. The ship's physician gave medical treatment 318 times. The catch by the Lunenburg vessels averaged about 2,000 quintals per vessel on the first summer trip. There were 50 French trawlers and 40 Portuguese trawlers operating on Grand Banks and the coast of Greenland."

During the period the *Arras* was engaged in fisheries duties she spent 116 days at sea and covered 5,648 miles.

From January 1 to February 8 the *Arleux* was engaged in lobster protection work on the southwestern coast of Nova Scotia, laying up for annual overhaul at Lunenburg on February 9. After completion of overhaul on March 29 the ship was engaged in biological investigation work on Emerald bank for a few days and then proceeded on patrol along the eastern coast of Nova Scotia and thence to Northumberland strait, breaking ice where necessary and enforcing the lobster fishing regulations. From May 28 to June 27 the *Arleux* was again required along the eastern and southwestern coasts of Nova Scotia. She returned to Northumberland Strait on August 3, remaining there until August 29 and giving particular attention to the protection of berried lobsters. From August 30 to September 12 the ship was laid up at Halifax for repairs to her hull. During the period the *Arleux* was engaged in fisheries duties she spent 126 days at sea and travelled 7,022 miles, while an additional 1,922 miles were covered by her motor launch.

FISHERIES PATROL SERVICE

NOVA SCOTIA

In Cape Breton Island the chartered patrol boat *Cabar Feidh* patrolled the waters of lobster fishing district 6A from May 16 to July 16 and covered a distance of 1,020 miles.

Along the eastern coast of the mainland patrol service was carried on by two boats owned by the department, the *Venning* and the *Gilbert*, and two smaller chartered boats, the *Marmat* and the *Daisy L.*

The *Venning* commenced patrol on April 1, being employed in Halifax county until the 26 of that month, proceeding from there to the strait section for the opening of the lobster fishing season in District No. 7. General patrol duties were carried out until June 19 when the boat proceeded to the Northumberland Strait shore of New Brunswick, where she remained until July 17. The boat was employed in the strait section from August 20 until October 19 for the protection of the lobster fishery. The boat then returned to the Atlantic Coast and worked in Guysboro and Halifax counties until laid up for annual repairs. A total of 8,329 miles was covered by this boat during the year.

The *Gilbert* was commissioned on May 16, and after repairs had been completed proceeded to the Bay Chaleur district, working there from June 17 to July 16. The boat was employed in Cumberland county patrolling the boundary line between lobster fishing districts Nos. 7 and 8 until October 19, after which patrol work was undertaken in Nova Scotia District No. 3, while the boat usually employed in that area was acting as mother ship to the Canso fishing fleet. The *Gilbert* was laid up at Lunenburg on January 18, 1940. A total of 6,063 miles was covered during the season.

The *Marmat* was placed on charter on April 29 and continued work until October 10. The boat was used in the strait section from the New Brunswick line to Mulgrave and during the season covered a total of 4,950 miles.

The *Daisy L.*, a small open motor boat, was placed on charter on August 15 for the protection of the lobster fishing in Cumberland county. The boat went off duty on October 5 after covering a total of 983 miles.

Close co-operation obtained between the patrol boats engaged in this district, and illegal fishing was kept at a minimum.

In the western district patrol was carried out by the department-owned boats *Capelin* and *A. Halkett*, assisted by small chartered boats, one at Yarmouth, one at Clark's Harbour and one in the vicinity of Chester.

At the beginning of the year the *Halkett* was engaged in lobster protection work, laying up at Lunenburg on January 27 for annual repairs and for the installation of a new engine. The boat again commenced duty on June 8. From June to October the boat was employed in patrol duties enforcing the salmon and lobster fishery regulations. From November 5 to December 31 the *Halkett* was stationed at Canso as a mother ship. A total of 4,055 miles was patrolled by this boat during the year.

The *Capelin* patrolled the waters of Nova Scotia from Yarmouth to Cape Split, in the Bay of Fundy. During the winter months she assisted the haddock and lobster fishing fleets at Westport and vicinity. In the course of the season the *Capelin* towed into port two schooners and fourteen boats that were in distress and needed assistance. The work of this boat was satisfactory and was instrumental in keeping down illegal lobster fishing. A total of 6,347 miles was covered in patrol work during the year.

NEW BRUNSWICK

In the Bay of Fundy section, the department's patrol boats *Thresher* and *Gannet Rock II* were again employed throughout the year. The *Gannet Rock* performed good work in preventing illegal lobster fishing during the summer months and in enforcing the lobster size limit during the open season. The *Thresher* operated from Welchpool and carried out a general patrol service throughout the district.

The *Gannet Rock II* operated at Grand Manan and covered a total of 7,019 miles. The *Thresher* covered a total of 6,668 miles after having been laid up nearly three months for engine repairs. This boat plays an important part in the coastal patrol service of the district as well as in rendering aid to fishing boats, and in procuring doctors for needy sick persons and taking them to hospital when necessary. Two small boats were also employed, one at Maces Bay and the other at Grand Manan. Both rendered valuable assistance in enforcing the lobster fishery regulations.

In the eastern section of the province the following chartered boats were employed in the Northumberland Strait area: *Gulf Rover*, *Gulf Racer*, *Gulf Ranger*, *Gulf Raider* and *Brant*, each with a crew of two. They did splendid work in the protective service and in giving aid to fishermen. In addition, two department boats, the *Gilbert* and the *Venning* were employed about a month and one-half each to assist in the administration of the salmon fishery, the former in Restigouche County to supervise the weekly close period and to tow pontoons to the New Mills salmon pond, the latter in the Miramichi to supervise the salmon drift-net waters. C.G.S. *Arleux* also gave assistance in checking lobster fishing licences in Westmorland County. Patrol boats in this district were employed during the period shown below:—

Name of Boat	Dates Employed	Mileage
<i>Gulf Raider</i>	May 1—November 16	6,298
<i>Gulf Racer</i>	May 25—November 30	6,042
<i>Gulf Ranger</i>	May 9—November 18	8,614
<i>Gulf Rover</i>	May 22—November 24	5,597
<i>Brant</i>	May 18—November 22	2,782

Prince Edward Island

Eight patrol boats were engaged during the season in fisheries protective work in Prince Edward Island—four in West Prince, three in Queens and one in Kings County. Assistance was also given by the department-owned patrol boat *Gilbert* and by the *Arleux* at intervals during the lobster fishing season.

The service rendered by the chartered patrol boat *Langholm*, operating in the North Cape-West Point area between May 8 and November 15, was satisfactory in every way. A total of 7,596 miles was patrolled during the season.

Alberton Bay and vicinity were well patrolled by the chartered boat *Thirza F.* during the period July 10 to November 26; approximately 3,685 miles were covered.

The patrol boat *May* operated at the North Point boundary line during the spring lobster fishing season and was employed from May 10 to June 30. A total of 1,170 miles was covered, with satisfactory results. During the late lobster fishing season the patrol boat *Dot* took over the patrol of the North Point boundary line and travelled 1,643 miles between August 10 and October 30.

The chartered boat *Laura May* rendered satisfactory service in the Souris-Georgetown area. This boat was on charter from August 1 to October 31, and patrolled a total of 4,362 miles.

The *Beulah*, a chartered boat operating in the Malpeque-North Lake area, gave very satisfactory service and patrolled a total of 2,535 miles between July 7 and September 22.

The *Lady K.*, also operating in the Malpeque-North Lake area, travelled 1,541 miles and was employed from August 1 to October 15.

The department-owned boat *Capitol* rendered services of a very gratifying nature in its operations in the Victoria-Georgetown area within the period June 1-October 31. Approximately 6,016 miles were covered during the season.

Speaking generally of the fishing protection and patrol services throughout the division, it can be said with assurance that there was effective protection during the fishing season. The greatest need is a protection of the lobster fisheries and the patrol boats named in this report are primarily engaged in this work. In addition the boats are also used in connection with the salmon, oyster, smelt and other fisheries and are of great assistance to the fishermen themselves.

STATEMENT OF LOBSTER PACK AND INSPECTION OF CANNERIES DURING 1939

During the year licences to pack lobsters and tomalley were issued covering 194 canneries. Of this number 191 were operated, compared with 213 in 1938, 239 in 1937, and 256 in 1936.

Comparative figures by provinces show the following distribution:

	1939	1938	1937	1936
Nova Scotia.....	55	63	72	76
New Brunswick.....	67	74	79	81
Prince Edward Island.....	60	65	73	84
Magdalen Islands.....	9	11	15	15
Totals.....	191	213	239	256

Lobster Pack.—Unrevised figures show a total 1939 production of canned lobster within the division of 85,578 cases, compared with 91,747 cases canned in 1938, a decrease of 6,169 cases or 6.6 per cent.

Comparing the 1939 pack with previous years, the following results are noted:

Year	Pack	Increase or Decrease	Percentage Increase or Decrease
	cases	cases	%
1939.....	85,578		
1938.....	91,746	— 6,169	— 6.6
1937.....	88,181	— 2,603	— 2.9
1936.....	87,390	— 1,812	— 2.07
1935.....	98,964	—13,386	—13.5

Provincial statistics of pack for 1939 show decreases in pack in Nova Scotia, Prince Edward Island and the Magdalen Islands, and an increase in pack in New Brunswick.

Province	1939	1938	Increase or Decrease
	cases	cases	cases
Nova Scotia.....	30,157	37,838	— 7,681
New Brunswick.....	25,706	23,060	+ 2,646
Prince Edward Island.....	24,616	24,625	— 9
Magdalen Islands.....	5,099	6,223	— 1,124
	85,578	91,746	— 6,168

The pack for Nova Scotia during 1939 shows a decrease of 20.3 per cent when compared with 1938 and shows the following decreases when compared with previous years:

Year	Pack	Decrease	Decrease
	cases	cases	%
1937.....	34,649	4,492	12.6
1936.....	37,690	7,533	19.9
1935.....	46,863	16,706	35.9
1934.....	50,553	20,396	40.3

The New Brunswick pack, when compared with 1938, shows an increase of 2,646 cases or 10.3 per cent. When compared with previous years the following increases or decreases will be noted:

Year	Pack	Increase or Decrease	Increase or Decrease
	cases	cases	%
1937.....	26,957	— 1,251	— 4.6
1936.....	20,428	+ 5,278	+25.8
1935.....	18,275	+ 7,431	+40.6
1934.....	23,815	+ 1,891	+ 7.9

The pack in Prince Edward Island shows a decrease of 9 cases or .04 per cent when compared with 1938. Compared with other years, the following increases and decreases will be noted:

Year	Pack	Increase or Decrease	Increase or Decrease
	cases	cases	%
1937.....	20,952	+ 3,664	+17.4
1936.....	22,345	+ 2,271	+10.1
1935.....	25,170	- 554	- 2.2
1934.....	30,214	- 5,598	-18.5

On the Magdalen Islands the pack shows a decrease of 1,124 cases or 18.0 per cent when compared with 1938. Compared with other years the following decreases will be noted:

Year	Pack	Decrease	Decrease
	cases	cases	%
1937.....	5,624	- 525	- 9.3
1936.....	6,927	- 1,828	-26.3
1935.....	8,656	- 3,557	-41.1
1934.....	10,097	- 4,998	-49.5

During the spring season of 1939 the pack was 62,547 cases as compared with 72,012 cases in the spring of 1938, a decrease of 9,465 cases or 13.1 per cent. Provincial figures covering spring pack show the following increases or decreases:

Province	Cases Packed		Increase or Decrease	Increase or Decrease
	1939	1938	cases	%
Nova Scotia.....	26,472	36,759	- 7,287	-19.8
New Brunswick.....	8,656½	8,561	+ 95½	+ 1.1
Prince Edward Island.....	19,319½	20,468	- 1,148½	- 5.5
Magdalen Islands.....	5,099	6,224	- 1,124	-18

During the fall season of 1939 the pack was 23,064½ cases, compared with 19,735 cases in 1938, an increase of 3,329½ cases or 16.8 per cent. Figures covering the fall pack show the following increases and decreases:

Province	Cases Packed		Increase or Decrease	Increase or Decrease
	1939	1938	cases	%
Nova Scotia.....	708	1,079	- 371	-34.3
New Brunswick.....	17,068	14,499	+ 2,569	+17.7
Prince Edward Island.....	5,288½	4,157	+ 1,131½	+27.2

Cannery Inspection.—During 1939 careful attention was again given to the inspection of all canneries and 1,135 inspections were carried out by 35 officers, the average number of inspections being 5.9 per cannery.

Underweights.—Particular care was again given in 1939 to "Underweights." During the year there were 11 instances of suspected underweights reported as against 14 in 1938, 16 in 1937 and 23 in 1936. Of the 11 lots reported, all were adjudged "Underweight."

The following number of cases were marked "Underweight" in 1939, as compared with 1938:

Province	1939	1938
Nova Scotia.....	8 cases 12 oz. pack 84 cases 6 oz. pack 25 cases 3 oz. pack	nil cases 12 oz. pack 19 cases 6 oz. pack 5 cases 3 oz. pack
New Brunswick.....	nil cases 12 oz. pack 21 cases 6 oz. pack 11 cases 3 oz. pack	nil cases 12 oz. pack 32 cases 6 oz. pack 10 cases 3 oz. pack
Prince Edward Island and Magdalen Islands.....	nil cases 12 oz. pack nil cases 6 oz. pack nil cases 3 oz. pack	nil cases 12 oz. pack 150 cases 6 oz. pack 65 cases 3 oz. pack
Totals.....	8 cases 12 oz. pack 105 cases 6 oz. pack 36 cases 3 oz. pack	nil cases 12 oz. pack 201 cases 6 oz. pack 80 cases 3 oz. pack

INSPECTIONS UNDER THE FISH INSPECTION ACT

Supervisor Robert Gray, who is directly responsible for the work under the Fish Inspection Act in this division, reports as follows with regard to inspections, etc., during the 1939 season:—

"A total of 7,323 inspections of containers and fish were made during the year, and 4,653 visits were made for educational purposes. Three thousand, two hundred and eighty-six inspections of fish curing premises, fish houses, utensils, etc., were conducted during the year and conditions as to cleanliness were reported good. There were 369,875 empty containers inspected, 2,011 of which had to be reconditioned. With reference to the Lunenburg salt fishing schooners, 28 vessels were sterilized, some of them twice; 65 vessels and 152 fish stores were inspected as to cleanliness, and wherever there was the least sign of red bacteria (*Halophilic* organisms) that vessel or fish store was sterilized, with the result that the quality of the 1939 cured product was the best ever shipped from Lunenburg.

"A total of 10,737 barrels of alewives was inspected; the greater part of this total being packed in Saint John and Halifax.

"The inspection of 5,762 barrels, 8,096 half barrels, 132 quarter barrels, 12,624 pails and 144 kits of herring was conducted, and it is gratifying to note that only 41 barrels, 2 half barrels and 237 pails had to be reconditioned. Of the total quantity inspected, 86 containers were found to contain 'Below Quality' fish. During the year, 136,709 boxes of hard cured smoked round herring were inspected.

"A total of 63,078 barrels, 831 half barrels, 849 pails and 5 kits was inspected, of which 139 barrels and 7 half barrels were reconditioned and 665 barrels and 3 half barrels were found to be 'Below Quality.' In addition, there were the following quantities of mackerel fillets inspected: 6,171 barrels, 3 half barrels, 68 pails and 45 kits. Of this lot 104 containers were found to hold 'Below Quality' fish.

"Oysters inspected during the year amounted to 14,903 barrels, 282 half barrels and 3,142 boxes.

"A total of 432,177 boxes of frozen smelts was inspected.

"During the year seven re-inspections of doubtful quality fish were conducted, amounting to 8,000 boxes of hard cured smoked round herring, 557 barrels of pickled split mackerel and 154 barrels of pickled mackerel fillets. After these fish were reconditioned their containers were officially stencilled correctly.

"Only one prosecution developed and that was for selling uninspected herring. The offending party pleaded guilty and paid a fine."

Supervisor Gray also gives the following comparison of work performed under the Fish Inspection Act for the past two years:—

	1939	1938
Educational visits.....	4,653	4,595
Inspections of premises.....	3,451	6,328
Empty containers inspected.....	369,875	311,205
Pickled alewives inspected.....	10,737	11,970
Pickled herring inspected (bbls.).....	5,762	17,814
Pickled herring inspected (half-bbls.).....	8,096	11,032
Pickled herring inspected (quarter bbls.).....	132	78
Pickled herring inspected (pails).....	12,624	10,854
Pickled mackerel inspected (bbls.).....	63,078	54,126
Pickled mackerel inspected (half bbls.).....	831	197
Pickled mackerel inspected (quarter bbls.).....	1	43
Pickled mackerel inspected (pails).....	849	439
Pickled mackerel fillets (bbls.).....	6,171	8,148
Pickled mackerel fillets (half bbls.).....	3	6
Pickled mackerel fillets (pails).....	68	129
Hard cured smoked round herring (boxes).....	136,709	221,231
Oysters inspected (barrels).....	14,903	21,156
Oysters inspected (boxes).....	3,142	2,530
Oysters inspected (half-bbls.).....	282	194
Frozen smelts inspected (boxes).....	432,177	160,921
Dried fish inspected (pounds).....	90,000	839,600

ILLEGAL FISHING

Speaking of the division as a whole, it can be said that the regulations were well observed during the year, but this required constant vigilance on the part of the staff available for this purpose, as will be observed by the following list of prosecutions and confiscations:—

	Prosecutions	Confiscations
Nova Scotia.....	96	374
New Brunswick.....	140	358
Prince Edward Island.....	20	78
Magdalen Islands.....	nil	2
	256	812

REDUCTION OF FISH WASTE AND COARSE FISH

During the year nineteen firms in this division produced fish meal and oil. Of these, twelve were located in Nova Scotia and seven on the Bay of Fundy coast of New Brunswick. Returns indicate that the following quantities of fish meal and oil were produced:—

	Quantity	Value
		\$
Fish meal.....	7,251 tons	350,917
Cod oil.....	40,818 gals.	24,032
Medicinal oil.....	47,359 gals.	33,214
Fish oil.....	6,150 gals.	1,590
Herring oil.....	42,864 gals.	8,209
Halibut livers.....	17,025 gals.	5,230

LOSS OF LIFE

It is regretted to report that sixteen fishermen lost their lives during the year in the course of their work. Eight were from Nova Scotian ports and eight from the province of New Brunswick.

LOSS OF GEAR

The estimated value of the fishing equipment destroyed by accident and storms during the year was \$163,000.

SEAL BOUNTY

The payment of bounty on hair seals was resumed in 1939 at the rate of \$2.50 per snout. The comparative numbers of seals destroyed may be seen in the following statement:—

	1939-40		1938-39	
	No. Seals	Bounty	No. Seals	Bounty
		\$ cts.		\$ cts.
Nova Scotia.....	2,001	5,002 50	2,107	5,267 50
New Brunswick.....	514	1,285 00	602	1,505 00
Prince Edward and Magdalen Islands.....	1,004	2,510 00	1,672	4,180 00
Totals for the Division.....	3,519	8,797 50	4,381	10,952 50

COLLECTION SERVICE

The bait collection service operated in the Canso area, commencing on July 24 and continuing until September 15 with good results. A total of 16,655 pounds of bait was collected and delivered to the fishermen at the price which had been paid for it.

The fresh fish collection service on the Guysboro coast was again put into effect, commencing on September 30 and terminating on January 8. The total quantities carried were somewhat less than in 1938.

FISHING FLEETS

There was little change in the condition of the different fishing fleets throughout the year. Three trawlers which had previously fished out of Halifax were turned to other uses in the latter part of the year, but after a time, they were replaced by a French craft and one from Newfoundland.

Twenty-five diesel powered vessels also fished out of Halifax. Nineteen additional vessels were reported operating out of Cape Breton Island, and one new one out of Lunenburg.

While some new gasoline boats were put in operation, many of these being built under the government loan plan, the total number of gasoline boats operated was somewhat less than in 1938.

The Lunenburg salt fishing fleet made three regular trips to the banks, and the landings were considerably less than in the previous year, as the following table will show:—

Trip	1939		1938	
	Vessels	Quintals	Vessels	Quintals
	number		number	
Frozen baiting trip.....	14	12,100	14	8,500
Spring trip.....	17	17,000	24	26,550
Summer trip.....	22	60,000	28	72,800
Fall trip.....	1	500		
		89,600		107,850

The boats operating in the scallop fishery decreased to 25, as against 45 in 1938 and 84 in 1937. Poor prices for the product was the reason for lack of activity.

The year saw no improvement in New Brunswick in the Gloucester cod fleet although 102 vessels operated out of Caraquet as against 92 in the previous year. These vessels are the survivors of a fast dwindling fleet.

The salmon drift-net fleet, operating mainly off the Miramichi, remained about the same; 192 boats were in operation, practically all of them the same boats as had operated in 1938.

EDUCATIONAL WORK

The usual instructional work in fish curing was carried out under the direction of Mr. Kenneth J. Sollows.

Dr. A. W. H. Needler, of the Fisheries Research Board, Ellerslie, P.E.I., did extensive educational work in connection with the cultivation of oysters, starting with the development and collection of spat.

Many visits by the department's administrative officers to fishermen and dealers are indicated by the section of this report dealing with fish inspection, but much information and instruction is given to fishermen of which no mention is made by the inspectors, as it is given in the course of their day-by-day work throughout the districts.

A large number of pamphlets on the necessity of sterilization of fresh and salt fish curing sheds, boats, vessels, etc., were distributed and instruction in connection with sterilization was given by the officers to help fishermen in producing quality cure and pack.

As during the past three years, educational work throughout the Gulf area and the Magdalen Islands was continued by adult education specialists of St. Francis Xavier University under arrangements made by the department. The program was particularly intensive on the east coast of New Brunswick, where splendid results have been obtained. In Prince Edward Island St. Dunstan's University carried on two or three courses for fishermen under the Youth Training program, which has stimulated the young men toward improvement in their condition, and in striving for quality product.

It is encouraging to note the change in the attitude of many dealers towards the department's program of education. When this was first initiated a number of years ago, many old reliable firms doubted the ability of the departmental officers—many of whom had no experience as fishermen—to give instruction in fish processing. They did not see that sound theory should precede experience, and the department's officers had received both through the Fisheries Experimental Station and their mingling with the fishermen and packers. It is common now to have the inspector of fisheries called on by the dealer for all kinds of information.

CHANGES IN STAFF

A number of changes in the staff took place in the division during the year. Inspector W. A. McAulay was named to replace A. G. McLeod as supervisor for Cape Breton. Mr. McLeod had retired on superannuation. It may be noted that Mr. McLeod died in the course of the year, much to the regret of those who had been associated with him.

Mr. Earle Lewis was appointed inspector in Cape Breton County, following the appointment of former Inspector McAulay as district supervisor.

Miss Muriel Smith replaced Miss Harris as clerk-stenographer in the district office at Pictou.

Mr. R. A. Murphy replaced Mr. Otto Garrison in Halifax West and a new temporary appointee, Mr. Wallace Graham, was named for fish inspection work in Halifax East.

Mr. H. H. Pothier and Mr. A. J. Fraser were appointed inspectors for Yarmouth County, following the retirement of Inspector J. G. D'Entremont, in 1938, after an extended period of service. The appointment of two inspectors for Yarmouth County was a return to the condition which formerly existed there. Experience had shown that one officer, no matter how efficient, could not adequately perform all the work required in the county.

In New Brunswick, Mr. A. Turbide was appointed to fill the vacancy caused by the retirement of Inspector M. W. Williston in 1938.

At Grand Manan, Mr. Sirdar K. Ingalls, of Seal Cove, was appointed in the place of the late Inspector W. E. Joy.

At Woodstock, Inspector C. E. Kilpatrick, mobilized with his regiment for overseas service, was replaced by a guardian who will carry on until the inspector's return.

In the Newcastle office, Miss Mary Cassidy replaced Miss Edna R. Bell, who retired from the service on her marriage in 1938.

ANNUAL REPORT OF CHIEF SUPERVISOR OF FISHERIES (MAJOR J. A. MOTHERWELL) WESTERN DIVISION (BRITISH COLUMBIA) FOR 1939

British Columbia's pack of all varieties of canned salmon in 1939 amounted to 1,539,057 cases which compares with an average of 1,633,102 cases for the past five years, as shown by the following particulars covering a period of twenty years:—

	Cases
1920-1924	1,234,109
1925-1929	1,716,456
1930-1934	1,367,179
1935-1939	1,633,102

SOCKEYE

The sockeye pack total of 269,888 cases was disappointing, although the figures do not give a true picture in so far as the run is concerned. Whilst nothing much was expected of the Fraser River, a considerably bigger pack was anticipated at Rivers and Smiths inlets. The 1939 total compares with an average of 361,716 cases for the past five-year period, as shown by the following statement:—

	Cases
1920-1924	303,836
1925-1929	304,503
1930-1934	337,897
1935-1939	361,716

Naas River Area.—The sockeye pack totalled 24,425 cases, a very satisfactory figure. The brood years of 1934 and 1935 showed packs of 36,242 cases and 12,712 cases, respectively.

Skeena River Area.—The sockeye pack reached 63,388 cases (the brood years, 1934 and 1935, produced packs of 54,558 cases and 52,879 cases, respectively) notwithstanding that the lower fishing boundary is situated seven miles farther downstream than was the case during the brood years, which would obviously have the result of reducing the catch.

Lowie Inlet Area.—The improved condition of the sockeye fisheries of this area is a source of considerable encouragement. In the opinion of the local officers the improvement has been brought about by the abolition of a considerable number of drag-seines and the closer supervision of fishing operations.

Rivers and Smiths Inlets.—The total sockeye pack of 71,068 cases was very disappointing, in view of the packs in the brood years of 1934 and 1935 totalling 89,575 cases and 166,686 cases, respectively. There was every reason to expect a considerably larger catch.

Whilst weather conditions are very bad in this particular area during the fishing season, they were unusually so during 1939, and this, no doubt, was a considerable factor in the curtailment of the catch. It was also found that the fish were considerably smaller, individually, a condition which resulted in a much greater percentage of the run than usual passing through the nets and proceeding to the spawning grounds. In this connection it is noted that 14·98 sockeye were required in 1939 to fill one case, whereas in the preceding year only 12·50 were required. The conditions on the spawning grounds would appear to show that the escapement at Rivers Inlet, particularly, has been satisfactory, and in this connection the inspecting officer observes: "It would seem that the escapement in relation to the commercial catch was really good."

Fraser River Area.—The total pack of 43,249 cases was a considerable disappointment to the industry, although there was no reason to expect much bigger returns for this particular cycle year. It is the only cycle which has shown decline in recent years and which will no doubt require special attention in the future. In the brood year of 1935 the pack was 57,212 cases.

The number of sockeye salmon required to fill a forty-eight one-pound tall case, in the several fishing areas, is as follows:—

Naas River	11·77
Skeena River	13·05
Rivers Inlet	14·98
Smiths Inlet	*
Bella Coola	16·80
Butedale	14·81
Fraser River	12·36

* No canning operations.

COHOES

A total coho pack of 196,887 cases compares with a total of 216,173 in 1935 and 212,343 in 1936. As has been previously explained, however, due to cold storage and fresh fish demands for this variety of salmon, the pack is not indicative of the run.

It will be observed that the total of bluebacks, which are immature cohoes, amounted to 48,209 cases, the highest on record. Had these immature fish been permitted to reach their full size before being taken it would have meant a considerable increase in poundage catch.

The following statement shows the five-year average pack of cohoes during the past twenty years:—

	Cases
1920-1924	110,018
1925-1929	167,397
1930-1934	143,813
1935-1939	202,616

PINKS

The year under review produced the largest pack of pink salmon since 1930, the total reaching 620,595 cases as compared with a pack of 514,966 cases in the brood year, 1935.

The following statement gives the two-year averages during the past fourteen years:—

	Cases
1926-1927	510,305
1928-1929	635,165
1930-1931	659,466
1932-1933	378,137
1934-1935	475,165
1936-1937	588,554
1938-1939	510,735

CHUMS

The total pack of chums, which reached 386,584 cases was disappointing. The fishing was intensive and had a larger run been available the pack would have been considerably increased. There is no doubt but that the run of the chum variety during the year was considerably smaller than usual, for no apparent reason, although in several instances freshets in previous years have no doubt had considerable bearing on the year's returns. The 1939 pack compares with an average of 476,617 cases for the past five years.

The following statement gives the average in five-year periods for the past twenty years:—

	Cases
1920-1924	280,558
1925-1929	632,042
1930-1934	314,137
1935-1939	476,617

CANNED SALMON INSPECTION

The following statements give the results of the year's inspection of canned salmon in the province, the total including some cases from the 1938 pack:—

Number of inspections made	3,045
Total number of cases inspected	1,661,938
Total number of cases below certificate standard	59,126½
Total number of cases available for certificates	1,602,811½

DETAILS OF CANNED SALMON INSPECTION ACCORDING TO SPECIES

Species	Number of Cases Inspected	Number of Cases Below Certificate Standard	Number of Cases Eligible for Certificates
Sockeye.....	283,878	8,346	275,532
Springs.....	16,792	35	16,757
Steelheads.....	1,026½	31	995½
Bluebacks.....	46,089½	252	45,837½
Coho.....	227,331½	1,519	225,812½
Pinks.....	634,525	47,287½	587,237½
Chums.....	452,295½	1,656	450,629½
Totals.....	1,661,938	59,126½	1,602,811½

PARTICULARS OF NON-CERTIFIED CANNED SALMON ACCORDING TO SPECIES

Species	Below Grade B	Grade B	Tips and Tails	Flaked, Minced, etc.	Smoked	Totals
Sockeye.....		4,080½	3,430	835½		8,346
Springs.....		11			24	35
Steelheads.....		20	11			31
Bluebacks.....		17	235			252
Coho.....	25	665	816	13		1,519
Pinks.....		45,606½	1,681			47,287½
Chums.....	144	1,401	111			1,656
Totals.....	169	51,801	6,284	848½	24	59,126½

A more detailed account of the operations of the Inspection Laboratory will be found in Appendix No. 6.

The inspection fees collected at the rate of one-half cent per case totalled \$8,249.

CANNED SALMON—FRENCH QUOTA

This year's allotment to Canada, by the French authorities, totalled 31,250 metric quintals.

DRY SALTED SALMON

In view of the fact that the provincial authorities withheld all licences for such operations, no dry salting was conducted during the year.

POWER BOATS IN SALMON GILLNET FISHING

The number of power boats used in salmon gillnet operations continues to increase, as shown by Statement No. 14.

SALMON TAKEN BY INDIANS OF THE PROVINCE FOR PURPOSES OF THEIR OWN FOOD SUPPLY, UNDER FREE PERMIT

—	Sockeye	Springs	Coho	Pinks	Chums	Steel-head	Total
	(fish)	(fish)	(fish)	(fish)	(fish)	(fish)	(fish)
<i>District No. 1—</i>							
Prince George.....	256	230					486
Quesnel.....	675	165					840
Kamloops.....	5,750	1,485	905				8,140
Hope.....	2,590	2,100	1,080	482	250	455	6,957
Squamish.....	3,800	1,000	1,200				6,000
North Vancouver.....		245	75	165	933		1,418
Chilliwack.....	5,160	2,510	4,260	5,445	4,845	1,930	24,150
Lower Mainland.....	750	900	3,320	5,300	3,565	250	14,085
	19,981	8,635	10,840	11,392	9,593	2,635	62,076
<i>District No. 2—</i>							
Upper Skeena.....	77,464	8,068	17,402	15,084		1,797	119,815
Lower Skeena.....	2,800	400	3,600		400		7,200
North Q.C. Islands.....	2,500				4,200		6,700
South Q.C. Islands.....	7,500				1,700		9,200
Naas River.....	57,145	2,000	6,000	4,000	3,000		72,145
Grenville-Principe.....			900	240	2,000		3,140
Butedale.....	500	200	5,300	1,400	4,500		11,900
Bella Bella.....	1,675				5,000		6,675
Bella Coola.....	1,330	1,000	1,200		3,000	1,000	7,530
Rivers Inlet.....	5,200	130			1,300		6,630
Smiths Inlet.....	300	90			450		840
	156,414	11,888	34,402	20,724	25,550	2,797	251,775
<i>District No. 3—</i>							
Cape Scott-Tuna Point....	2,260			3,100	8,320		13,680
Tuna Point-Shelter Point..	400	310	3,700	6,600	19,500		30,510
Shelter Point-French Creek					650		650
French Creek-Shoal Har-		680	7,200		53,460		61,340
bour.....							
Shoal Harbour-Sombrio			600		1,800		2,400
Point.....							
Sombrio Point-Pachena							
Point.....	2,800	160	2,600	200	22,932		28,692
Barelay Sound-Point							
Alberni.....	2,169	850	3,800		48,500		55,319
Wreck Bay-Estevan Point..	25	250	800		2,100		3,175
Estevan Point-Tatchu							
Point.....		140	260		2,150		2,550
Tatchu Point-Cape Cook..		230	300		2,460		2,990
Cape Cook-Cape Scott.....					1,120		1,120
George Point-Gower Point..			4,800	5,000	26,660		36,460
	7,654	2,620	24,060	14,900	189,652		238,886

SALVAGING OF SALMON FRY

The following statement shows the quantity of salmon fry which had been found stranded in various streams and were transferred by the fishery officers to deep water:—

—	Method	Coho	Chums	Springs	Steel-head	Cut-throat	Total
<i>District No. 1—</i>							
Squamish.....	Netting	800		350			1,850
Squamish.....	Ditching	600		100			
Chilliwack.....	Netting						14,600
Chilliwack.....	Ditching	5,500	9,000				
North Vancouver.....	Netting						1,100
North Vancouver.....	Ditching	1,000	100				
Mission.....	Netting						1,800
Mission.....	Ditching	800	1,000				
Kamloops.....	Netting						100
Kamloops.....	Ditching				100		
<i>District No. 3—</i>							
Nanaimo.....	Netting	72,000					72,000
Nanaimo.....	Ditching						
Cowichan.....	Netting	71,200	65,000	16,900	1,900		155,000
Cowichan.....	Ditching						
Comox.....	Netting	14,700					14,700
Comox.....	Ditching						
Alberni.....	Netting	162,000					162,000
Alberni.....	Ditching						
Totals.....		328,600	75,100	17,350	2,000	100	423,150

SALMON CULTURE

A further planting of 1,030,830 eyed sockeye eggs, collected at Anderson Lake, was made at Maggie Lake. The total collection amounted to 1,050,000, the loss being 19,170.

There is insufficient evidence as yet for conclusion as to the effect of these operations.

HALIBUT

The total landings of halibut at British Columbia ports by Canadian and United States fishermen during the year amounted to 227,188 hundredweights, or 33,700 hundredweights greater than the landings of the previous year, as shown by the following statement:—

Year	Vancouver and New Westminster	Prince Rupert	Butedale	Vancouver Island points	Totals
	cwts.	cwts.	cwts.	cwts.	cwts.
1930.....	11,387	293,617	978	2,814	308,796
1931.....	8,498	167,757	3,627	2,123	182,005
1932.....	11,883	148,615	6,677	1,672	168,847
1933.....	13,436	144,065	10,431	2,440	170,372
1934.....	16,113	150,476	13,297	2,716	182,602
1935.....	22,351	129,586	15,713	3,493	171,143
1936.....	20,777	131,830	11,522	3,992	168,121
1937.....	23,334	147,638	12,676	3,777	187,425
1938.....	28,155	141,691	17,776	5,866	193,488
1939.....	30,225	173,857	18,651	4,455	227,188

Of the 1939 landings 133,967 hundredweights, or 13,720 hundredweights more than in 1938, were made by Canadian vessels.

HALIBUT LIVER PRODUCTION

Again, in the year under review, there is shown an increase in the quantities of halibut livers landed at British Columbia ports. The total landings by Canadian and United States fishermen reached 3,853 hundredweights which is the largest on record. The average value also shows an increase, being \$53.70 as compared with \$50.97 for the preceding year. The Canadian landings in 1939 were 2,186 hundredweights.

The following statement gives halibut liver production figures for the past seven years:—

Year	Cwts.	Marketed Value	Average Value per Cwt.
		\$	\$ cts.
1933.....	2,293	45,995	20 06
1934.....	1,562	36,439	23 33
1935.....	1,812	80,513	44 43
1936.....	1,916	96,311	50 27
1937.....	1,782	94,405	52 97
1938.....	3,049	155,420	50 97
1939.....	3,853	206,916	53 70

COD LIVERS

The quantity of cod livers marketed (all varieties of cod) was 1,152 hundredweights, compared with 1,403 hundredweights during the previous year. The average price was \$33.10 per hundredweight compared with \$37.42 per hundredweight.

The following statement reviews cod liver returns for the past seven years:—

Year	Cwts.	Marketed Value	Average Value per Cwt.
		\$	\$ cts.
1933.....	486	9,773	20 10
1934.....	825	16,772	20 33
1935.....	1,127	43,367	38 48
1936.....	1,430	59,654	41 72
1937.....	827	33,884	40 97
1938.....	1,403	49,368	35 19
1939.....	1,152	43,111	37 42

SHRIMPS

All of the year's catch of shrimps was marketed in the fresh state. In earlier years part of the catch was canned as shown by the following statement:—

Year	Marketed Fresh	Canned
	cwts.	cases
1932.....	1,109	209
1933.....	1,247	35
1934.....	933	336
1935.....	1,545	483
1936.....	646	25
1937.....	652	222
1938.....	864	460
1939.....	831	.....

OYSTERS

There was a considerable increase over the previous season in the quantity of oysters used fresh and in the quantity canned, as will be seen by the details given below:—

Year	Marketed Fresh	Canned
	bbls.	cases
1930.....	3,197	
1931.....	3,555	
1932.....	2,010	
1933.....	2,231	
1934.....	2,437	860
1935.....	2,266	1,087
1936.....	2,594	3,601
1937.....	1,745	587
1938.....	1,365	1,426
1939.....	2,691	3,647

HERRING—GENERAL

An outstanding feature in the herring fisheries was the discovery, at Kwakshua, which lies between Calvert Island and Hecate Island, in District No. 2, of the largest body of herring yet observed in British Columbia waters. New supplies were also found in the Alert Bay area in District No. 3.

The following statement gives interesting information regarding the catches under the quota system as applied to the herring fishing areas in District No. 3:—

—	Quatsino	Kyuquot	Nootka	Clayoquot	Barclay Sound	East Coast Vancouver Island
	tons	tons	tons	tons	tons	tons
Quota.....	5,000	10,000	10,000	5,000	15,000	25,000
Catch—						
1935-36.....	165	8,217	3,441		13,433	17,828
1936-37.....	1,634	10,045	5,460	3,471	20,053*	23,256
1937-38.....	5,147	6,110	3,770	247	15,060½	24,955
1938-39.....	5,120	785	2,176	688	6,315	26,623

* -- Taking an additional 5,000 tons authorized, for this season only.

Although since 1934 there has been some demand for canned herring, the pack had never exceeded 52,000 cases, which was the total for 1936. During the year under review, however, a total of 222,658 cases have been packed, as shown by the following statement:—

	cases
1934.....	2,295
1935.....	
1936.....	51,695
1937.....	27,365
1938.....	23,376
1939.....	222,658

HERRING—DRYSALTED

The dry salting of herring was again restricted, due to the difficult marketing conditions obtaining in the Orient as a result of the present conflict. Production figures for the year are shown by Statement No. 8.

PILCHARDS

Statement No. 9 shows the total pack of canned pilchards as 7,300 cases, one of the smallest outputs on record while Statement No. 10 shows that only 906 tons of fish meal and 178,305 gallons of oil were obtained from the pilchard run. This was due entirely to the fact that these particular fish did not arrive off the coast of British Columbia in any quantities in 1939. Most of the catch taken was made in extra-territorial waters off the State of Washington. It was just another of those seasons which cannot be explained, although it is hoped that the present investigation of the fishery by the officers of the Fisheries Research Board will, in time, provide information which will explain these occurrences.

CLAMS

The statement given immediately below shows a considerable falling off in the quantity of clams marketed. This was due, primarily, to the fact that there were no razor clam operations in the Queen Charlotte Islands area in 1939:—

Year	Marketed Fresh	Canned
	cwts.	cases
1934.....	6,332	5,815
1935.....	15,716	10,209
1936.....	26,530	12,579
1937.....	27,018	12,587
1938.....	42,169	22,155
1939.....	21,601	5,431

CRABS

The landings of British Columbia crabs totalled 10,912 hundredweights, the largest catch in recent years. The quantity canned totalled 2,049 cases. Practically all the canning is done at Naden harbour on the north shore of the Queen Charlotte Islands.

The following statement shows the disposition of the crab catch during the past twelve years:—

Year	Marketed Fresh	Canned
	cwts.	cases
1928.....	5,878	.....
1929.....	5,496	671
1930.....	4,459	295
1931.....	4,968	204
1932.....	2,952	251
1933.....	3,766	999
1934.....	3,187	1,267
1935.....	4,336	1,322
1936.....	4,347	1,312
1937.....	4,948	1,546
1938.....	4,337	2,157
1939.....	6,814	2,049

WHALES

Owing to the fact that at the commencement of the year marketing conditions appeared unattractive, no whaling operations were undertaken by any British Columbia concern during 1939.

Statement No. 11 gives particulars of the whaling catches in recent years.

TUNA

The year 1939 was the first season in which tuna had been sought by British Columbia commercial fishermen and while operations were more or less of an experimental nature, 2,838 hundredweights were landed. This catch produced 3,016 cases canned and 50 hundredweight of livers. Fishing operations were confined to the months of August and September, off the west coast of Vancouver Island, and the State of Washington, some fifteen boats being engaged.

FISH MEAL AND OIL

Statement No. 10 shows a sharp falling off in the production of pilchard meal and oil, owing to the failure of the pilchard run, and a blank as regards production of whale meal and oil since, as already noted, no operations were in progress. There was, however, a very considerable increase in the quantity of meal and oil from herring, as the result of the exceptionally large quantities of these fish being found in the northern district, particularly at Kwakshua Pass.

FUR SEAL SKINS

The take of fur seal skins during 1939 was the smallest since 1934. All were taken off the shores of District No. 3, by Indians, under the privileges accorded them by the Pelagic Sealing Treaty of 1911. The decline was undoubtedly due partly to lack of demand, the price being \$2.50 per skin, but probably mostly to the new requirements in the way of precautions to see that the terms of the treaty are properly respected.

Statement No. 12 shows the number of fur seals taken yearly by British Columbia Indians since 1912.

DESTRUCTION OF SEA LIONS

Particulars of sea lions destroyed by the crews of departmental patrol boats are as follows:

Where destroyed	Adults	Pups	Total
Bare Island Thorneby Island (Malaspina Straits).....	6		6
Long Beach Rocks.....	37		37
Virgin Rocks.....	105	34	139
Solander Island.....	141		141
East Haycocks.....	406	415	821
Pearl Rocks.....	13		13
Kwakshua Area.....	54		54
Isnor Rock.....	34		34
Totals.....	796	449	1,245

HAIR SEALS

The following statement gives particulars of payments in the way of bounty for the destruction of hair seals in British Columbia:

Fiscal Year	Rate	Number	Amount
	\$ cts.		\$ cts.
1914-1915.....	3 50	2,237	7,829 50
1915-1916.....	1 00	749	749 00
1916-1917.....	1 00	785	785 00
1917-1918.....	1 00	748	748 00
1927-1928.....	3 50	567	1,984 50
1928-1929.....	3 50	3,209	11,231 50
1929-1930.....	2 50	5,944	14,860 00
1930-1931.....	2 50	6,308	15,770 00
1931-1932.....	2 50	6,084	15,210 00
1932-1933.....	2 00	4,300	8,600 00
1933-1934.....	1 50	400	600 00
1936-1937.....	1 50	1,933	2,899 50
1937-1938.....	2 50	4,295	10,737 50
1938-1939.....	2 50	4,569	11,422 50
1939-1940.....	2 50	3,546	8,865 00
Totals.....		45,674	112,292 00

ENGINEERING WORK

In Appendix No. 3 of this report will be found reference to the work which engaged the attention of the Engineering branch of the department's British Columbia service during the year.

VIOLATIONS

The year's total prosecutions for violation of the fishery regulations reached 285. The total revenue accruing therefrom was \$12,159.41 as shown by the following statement.

—	District No. 1	District No. 2	District No. 3	Total
Prosecutions.....	57	105	123	285
Fines.....	\$ 539 00	\$ 2,796 00	\$ 3,392 50	\$ 6,727 50
Sales.....	\$ 946 49	\$ 3,973 83	\$ 511 59	\$ 5,431 91
Total Fines and Sales.....	\$ 1,485 49	\$ 6,769 83	\$ 3,904 09	\$ 12,159 41

PATROL SERVICE

There were 102 power boats and 15 rowboats used in the protection of the fisheries of the British Columbia coast. Twenty-two of the power boats were the property of the department, eighty of the power boats and all fifteen rowboats were chartered, as shown below:

—	Number	Total
<i>Departmentally owned—</i>		
Malaspina, Nitinat, Kitimat (steam and diesel).....	3	
District No. 1 (gas and diesel).....	5	
District No. 2 (gas and diesel).....	10	
District No. 3 (gas and diesel).....	4	22
<i>Chartered—</i>		
District No. 1 (gas and diesel).....	1	
District No. 2 (gas and diesel).....	25	
District No. 3 (gas and diesel).....	54	80
District No. 1 (row).....	nil	
District No. 2 (row).....	4	
District No. 3 (row).....	11	15
		117

The two new patrol boats provided during the year, the C.G.S. *Nitinat* and C.G.S. *Kitimat*, have proved very satisfactory. As a result of war conditions, however, the C.G.S. *Malaspina* and C.G.S. *Nitinat* were transferred from the fisheries service to other duty on September 6 and September 18, respectively.

The following distances were logged by the four boats of the Fisheries Protection Service:

<i>Malaspina</i>	16,343 miles, to Sept. 6, 1939
<i>Nitinat</i>	4,726 miles, to Sept. 18, 1939
<i>Givenchy</i>	4,514 miles, to April 15, 1939.
<i>Kitimat</i>	12,871 miles, from May 10, 1939

A total of 297 hours, 20 minutes was utilized in the flying branch of the patrol service, as shown below:

Base	Hours	Minutes
Alert Bay	63	35
Nanaimo	74	40
Bella Bella	157	05
Vancouver	2	..
	<hr/> 297	<hr/> 20

Flying time for other years had been as follows:

Year	Hours	Minutes
1927	92	02
1928	261	30
1929	408	08
1930	443	40
1931	319	25
1932	275	25
1933	260	25
1934	262	10
1935	302	50
1936	253	..
1937	257	35
1938	303	30
1939	297	20

NEW MARINE WAYS AND REPAIR SHOP, NEW WESTMINSTER

The old quarters on Poplar Island were found to have outlived their usefulness and more suitable accommodation was provided for the care and overhaul of the departmentally owned boats in the form of new marine ways, machine shop, and floats, on the mainland side of the North arm of the Fraser River, inside the boundary of the City of New Westminster. At this point there is deep and reasonably still water, and facilities in the way of electrical power and water are conveniently near. With this new accommodation considerably more and better work can be performed by the department's own staff, with resultant increased efficiency and economy.

DEPARTMENTAL STAFF

Those employed during the year in the several capacities in the division were as follows:—

Supervisors, inspectors, and clerical staff	57
General (inspection of spawning grounds, etc.)	20
Guardians	50
Patrolmen and boat crews	202
Fish culture	3
Removal of obstructions	20
Total	<hr/> 352

SPORT FISHING—TIDAL WATERS

Sport fishermen enjoyed a good year in the tidal waters of the province, particularly in the blueback, spring, and coho fishing, all along the eastern shores of Vancouver Island, as well as in Howe Sound, Horseshoe Bay, and the mouths of the several streams in District No. 1. In the Port Alberni district this class of fishing is also becoming increasingly popular.

One of the chief attractions developed in recent seasons is the fishing for coho salmon with a buck tail fly. This lure used on light tackle provides increasingly popular sport, particularly in the Campbell River and Cowichan districts. Excellent steelhead and cutthroat trout fishing is also obtained at the mouths of most of the streams on Vancouver Island and the mainland, although sport fishing has not been indulged in to any great extent at points distant from the populated centres, save by the numerous yachting parties, both local and foreign, who find British Columbia sport fishing all along the coast increasingly attractive.

FISHERIES ENQUIRY

By Order in Council under date of the 23rd of June, 1939, the Honourable Gorden McG. Sloan, Puisne Judge in the Court of Appeal in British Columbia, was appointed a commissioner to investigate and hear evidence under oath and to determine:

"1. Whether or not it is in the public interest that trap-nets for the capture of salmon should continue to be authorized in the Sooke area, British Columbia, i.e., between Beachy Head and Sombrio Point along the southwest coast of Vancouver Island, such investigation to have regard to all such points as in the judgment of the Commission require consideration, and without restricting the generality of the foregoing to include the following:

"(a) Destructiveness of trap-nets from the standpoint of conservation, as compared with the use of other varieties of fishing gear;

"(b) Feasibility of successful operation of other types of fishing gear in Juan de Fuca Strait and waters of and adjacent to the Sooke area keeping in view, among other things:

"(1) Nature of waters, whether specially exposed or otherwise;

"(2) Tidal and current conditions;

"(3) Unusual phosphorescence, if any, in water;

"(4) Proximity of International Boundary;

"(5) Fog, prevalence of sharks, etc.

"(c) The signification of continued operation of trap-net fishing in the Sooke area in relation to the possible reintroduction of trap-nets in the state of Washington;

"(d) Whether or not unemployment is accentuated by the operation of trap-nets in the Sooke area.

"2. Whether or not it is in the public interest that purse-seines for the capture of pink salmon and 'late' sockeye salmon should continue to be authorized in that portion of Area No. 17 as defined in Section 5 of the Special Fishery Regulations for British Columbia, lying easterly and northerly of Galiano and Valdes Islands, bounded as follows: From a straight line drawn from the western side of the entrance to Active Pass to the most westerly point of the International Boundary on the 49th parallel of north latitude, thence following the International Boundary easterly to the outer range light on the said boundary, thence in a westerly direction magnetic to a red conical buoy moored in about twenty fathoms (36^m6) off the entrance to Canoe Pass on the south side of Roberts Bank, thence in a straight line

drawn due west, parallel to the 49th parallel of north latitude to Valdes Island, such investigation to have regard to all such points as in the judgment of the Commission require consideration, and without restricting the generality of the foregoing to include the following:

- “(a) Whether or not the purse-seining permitted is unduly destructive to immature salmon or other fish;
- “(b) Whether or not the extent of varieties of salmon other than pinks and ‘late’ sockeye, caught by purse-seines there is of significance in relation to the livelihood and earnings of gill-netters;
- “(c) Whether or not purse-seining there has the effect of breaking up schools of salmon in such a way as to be detrimental to the interests of the gill-netters;
- “(d) The feasibility of the successful operation of gill-nets in the waters where seining is being allowed;
- “(e) Whether or not a superior pack and consequently a greater economic return is being secured from the catch taken by purse-seining there than would otherwise be obtained.”

The calendar year expired without all evidence having been submitted and the inquiry was continuing.

STATEMENT No. 1—ANNUAL CANNED SALMON PRODUCTION IN BRITISH COLUMBIA

Year	Num-ber of can-neries oper-ated	Number of salmon licences issued				Pack canned										Totals
		G.N. Troll	P.S.	D.S.	T.N.	Sockeye	Red Spring	Pink Spring	White Spring	Blue-back	Steel-head	Coho	Pink	Chum	cases	
1925	65	4,225	1,821	329	37	19	39,142	4,419	29,938	10,675	1,996	188,505	445,400	607,904	1,720,622	
1926	76	4,750	2,416	445	41	6	41,276	4,177	23,736	19,445	2,165	162,449	772,993	701,962	2,065,198	
1927	76	5,637	3,093	555	46	7	34,029	8,819	16,129	20,820	1,462	161,148	247,617	562,109	1,360,449	
1928	62	5,179	2,987	399	22	7	11,002	2,328	5,526	6,073	865	150,684	792,362	863,257	2,035,656	
1929	63	5,609	2,630	371	24	7	8,295	3,156	7,926	22,246	672	174,198	477,969	424,982	1,400,750	
1930	59	6,061	3,115	343	21	7	20,184	6,650	11,970	42,033	1,656	148,561	1,111,937	401,114	2,221,783	
1931	35	4,893	3,115	228	21	7	17,526	4,727	4,894	25,296	1,326	76,879	206,995	55,997	685,104	
1932	44	5,359	3,033	157	30	7	46,953	14,133	14,974	28,505	1,168	160,466	223,716	306,761	1,081,031	
1933	49	6,113	2,880	238	31	8	12,464	1,849	5,953	21,763	1,459	137,289	532,558	293,630	1,265,072	
1934	49	6,826	3,099	296	9	8	15,281	1,644	12,859	29,556	1,282	195,874	435,364	513,184	1,582,926	
1935	43	6,216	3,107	293	9	8	10,187	3,114	8,619	15,319	596	216,173	514,966	409,604	1,529,022	
1936	46	6,620	3,511	287	9	7	16,493	2,527	10,834	33,718	1,068	212,343	591,532	597,487	1,881,026	
1937	37	6,095	3,162	291	9	5	10,963	1,788	3,420	19,236	844	113,972	585,576	447,602	1,509,175	
1938	38	7,125	3,453	300	9	5	10,276	2,322	2,933	27,417	1,035	273,706	400,876	541,812	1,707,830	
1939	35	6,502	3,947	339	9	5	10,302	2,848	2,947	48,209	797	196,887	620,595	386,584	1,539,057	

NOTE.—Licences issued include transfers from one district to another, except in the case of purse-seines after 1929.

STATEMENT No. 2—PACK OF CANNED SALMON ON THE NAAS RIVER—1925 TO 1939

Year	Num-ber of can-neries oper-ated	Number of salmon licences issued					Pack canned								Totals	
		G.N.	Troll	P.S.	D.S.	T.N.	Sockeye	Red Spring	Pink Spring	White Spring	Blue-back	Steel-head	Coho	Pink		Chum
*1925	3	210					cases 20,351	cases 5,441	cases 387	cases 538	cases	cases 470	cases 8,188	cases 35,880	cases 23,497	cases 94,752
†1925							18,945	4,067	387	392		457	7,726	34,530	22,504	89,008
*1926	4	316					15,929	4,616	751	597		375	4,274	43,891	15,392	85,825
†1926							15,929	4,616	751	597		375	4,274	50,815	15,392	92,749
*1927	4	302					11,986	3,221	511	213		96	3,845	16,609	3,307	39,788
†1927							11,986	3,221	511	213		96	3,845	16,609	3,307	39,788
*1928	3	263					15,558	1,471	68	615		36	18,002	95,998	4,591	126,339
†1928							5,540	1,471	68	307		36	10,734	83,183	3,538	104,877
*1929	3	240					16,347	256	57	96			1,195	10,507	1,261	29,719
†1929							16,077	256	57	96			1,145	10,342	1,212	29,185
*1930	3	282					26,500	1,772	283	176		137	5,555	90,163	4,330	128,916
†1930							26,405	1,722	283	176		84	961	79,976	3,853	113,460
*1931	1	235					16,929	1,010	323	106			8,943	5,178	660	33,149
†1931							9,146	1,010	323	106			443	3,575	392	14,995
*1932	3	278					15,138	5,848	264	468		23	33,495	51,920	15,070	122,226
†1932							14,154	3,676	264	468		40	7,955	44,629	14,515	85,671
*1933	3	297					10,173	1,014	227	214		114	19,016	57,406	2,778	90,942
†1933							9,757	885	227	184		49	3,251	44,306	1,775	60,434
*1934	3	335					36,242	533	126	145		311	26,698	37,698	5,558	107,311
†1934							28,701	383	126	145		311	9,935	32,965	2,648	75,214
*1935	3	310					12,712	94	298	168		143	21,810	25,508	17,481	78,214
†1935							12,245	86	298	168		143	5,125	21,443	12,681	52,189
*1936	3	349					28,562	1,622	229	316		496	11,842	72,022	20,196	135,285
†1936							24,137	520	188	237		496	8,439	60,582	16,504	111,103
*1937	2	321					17,590	773	245	232		46	12,336	7,876	10,530	49,628
†1937							11,630	773	245	232		46	3,16	5,688	6,009	24,939
*1938	2	309					21,746	458	189	125		188	20,485	61,660	15,135	119,986
†1938							14,795	13	165	125		188	3,986	29,843	6,804	55,919
*1939	2	289					24,425	170	389	149		15	3,209	29,819	2,615	60,791
†1939							18,834	17	297	137		15	1,667	19,479	1,784	42,230

* Pack of fish caught at Naas river regardless where canned.

† Pack of Naas river regardless where caught.

NOTE.—Licences issued, except 1925, include transfers from other districts.

STATEMENT No. 3—PACK OF CANNED SALMON ON THE SKEENA RIVER—1925 TO 1939

Year	Num-ber of can-eries oper-ated	Number of salmon licences issued					Pack canned									
		G.N.	Troll	P.S.	D.S.	T.N.	Sockeye	Red Spring	Pink Spring	White Spring	Blue-back	Steel-head	Coho	Pink	Chum	Totals
						cases	cases	cases	cases	cases	cases	cases	cases	cases	cases	cases
†1925	13	1,067					77,785	17,811	1,657	2,457		700	38,029	127,226	10,687	276,352
†1925							81,149	19,185	1,657	2,603		713	39,168	130,083	74,308	348,866
†1926	15	1,129					82,307	17,896	966	1,750		764	30,153	170,586	46,382	350,804
†1926							82,357	17,896	966	1,750		764	30,209	210,064	63,527	407,533
†1927	13	1,195					83,988	13,595	3,567	1,600		646	25,209	38,903	9,656	177,173
†1927							83,984	14,856	3,567	1,600		580	25,623	38,761	18,659	187,639
†1928	11	1,208					34,524	4,121	988	354		231	18,751	191,812	11,792	262,616
†1928							34,559	5,043	988	354		241	30,194	209,579	17,751	298,709
†1929	11	1,143					77,714	3,795	441	383		13	37,138	94,846	3,625	217,955
†1929							78,014	3,795	441	383		13	37,456	95,305	4,835	220,242
†1930	11	1,202					130,952	6,589	1,047	322		60	24,191	214,266	3,327	380,754
†1930							132,372	6,674	1,047	324		58	29,203	275,642	5,057	450,377
†1931	8	1,076					107,936	7,040	2,284	534		768	20,146	41,264	3,893	183,865
†1931							93,029	7,040	2,284	534		768	10,737	44,807	3,610	162,809
†1932	10	1,119					59,916	16,378	9,419	2,472		404	48,312	58,261	38,549	233,711
†1932							52,624	14,268	9,419	2,472		365	20,549	32,519	28,756	160,972
†1933	10	1,218					30,506	2,626	444	227		267	39,896	95,783	15,714	185,463
†1933							27,693	6,805	444	828		201	21,366	79,932	10,970	148,239
†1934	9	1,164					70,654	6,844	592	860		114	54,470	125,163	24,388	283,085
†1934							54,558	6,809	592	860		131	21,298	27,628	6,242	118,118
†1935	9	1,053					64,140	3,443	429	188		12	45,512	99,412	31,807	244,943
†1935							52,879	3,422	429	188		14	23,498	81,868	8,122	170,420
†1936	8	970					97,823	4,883	455	435		33	55,198	178,299	36,899	374,018
†1936							81,960	3,781	414	356		33	32,142	92,997	15,343	227,026
†1937	7	850					55,811	3,788	382	315		21	34,502	72,455	37,431	204,705
†1937							41,023	3,704	382	315		21	14,573	57,623	10,027	127,668
†1938	6	1,049					73,508	3,361	1,165	259		42	100,668	146,676	34,735	360,454
†1938							46,988	2,916	1,141	259		42	38,542	69,299	14,668	173,855
†1939	6	844					96,358	3,277	1,488	348		55	48,973	127,521	15,666	293,686
†1939							68,388	3,124	1,396	336		55	27,115	91,559	6,360	198,333

† Pack of fish caught at Skeena river regardless where canned.

‡ Pack at Skeena river regardless where caught.

NOTE.—Licences issued include transfers from other districts.

REPORT OF THE DEPUTY MINISTER

Year	Num-ber of can-neries oper-ated	Number of salmon licences issued				Pack canned										
		G.N.	Troll	P.S.	D.S.	T.N.	Sockeye	Red Spring	Pink Spring	White Spring	Blue-back	Steel-head	Coho	Pink	Chum	Totals
							cases	cases	cases	cases	cases	cases	cases	cases	cases	cases
1925	11	1,127					201,186	344	311	116		10	4,887	7,675	11,501	226,030
1926							170,581	215	311	57			4,866	8,625	11,477	196,132
1927	12	1,483					89,866	535	249	160		27	10,348	8,493	14,690	124,368
1928							74,629	473	189	142		11	7,448	13,503	11,751	108,146
1929	13	1,842					101,053	463	530	321		19	5,475	1,383	5,027	114,271
1930							87,145	322	530	321		17	4,980	1,402	3,617	98,354
1931	11	1,541					93,361	458	443	157		13	9,761	3,130	9,200	116,523
1932							88,876	156	443	152		13	1,098	16,703	3,626	111,066
1933	13	1,577					79,548	546	215	127		47	8,270	3,112	6,536	98,401
1934							77,669	140	239	107		41	3,239	1,340	1,091	83,866
1935	12	1,833					150,398	614	383	229		182	6,760	17,476	18,372	194,414
1936							141,684	275	383	215		208	2,084	34,638	2,135	181,622
1937	5	1,433					92,872	218	61	183		67	5,536	2,296	544	101,779
1938							80,732	200	82	165		68	6,683	3,724	562	92,216
1939	10	1,754					76,110	405	236	145		56	11,871	4,305	5,516	108,644
1940							85,358	128	236	143		49	7,335	4,631	1,109	98,989
1941	11	1,962					119,548	606	108	243		153	9,078	11,658	8,932	150,226
1942							114,045	454	108	241		169	8,514	25,054	9,518	158,103
1943	11	2,318					89,575	532	82	129		121	11,862	2,928	14,375	119,604
1944							82,828	390	82	128		122	8,793	9,769	16,444	118,566
1945	8	2,023					166,686	138	352	155		63	9,576	8,966	19,563	205,499
1946							129,531	195	306	146		49	917	6,045	7,128	144,216
1947	8	2,210					59,138	317	132	162		60	7,432	6,497	13,158	86,896
1948							42,803	315	131	148		54	7,683	17,254	10,921	79,309
1949	6	1,875					108,170	377	396	235		75	6,374	7,973	18,894	142,494
1950							91,599	335	452	233		76	5,931	18,873	21,931	138,631
1951	6	2,261					122,093	744	181	359		169	17,527	10,827	15,832	167,732
1952							86,490	716	136	351		99	14,284	12,447	17,102	131,625
1953	4	1,817					71,068	412	206	329		133	16,125	14,580	7,437	110,290
1954							56,937	285	32	306		82	6,302	19,256	4,903	68,103

NOTE.—Figures shown in roman are packs from fish caught at Rivers inlet or Smiths inlet. Figures shown in italics are actual packs irrespective of where fish taken and not including fish shipped out for canning in other districts. Licences issued include transfers from other districts.

DEPARTMENT OF FISHERIES

STATEMENT No. 5—PACK OF CANNED SALMON IN THE FRASER RIVER DISTRICT—1925 to 1939

Year	Num-ber of can-neries oper-ated	Number of salmon licences issued					Pack canned										Totals
		G.N.	Troll	P.S.	D.S.	T.N.	Sockeye		Red Spring	Pink Spring	White Spring	Blue-back	Steel-head	Coho	Pink	Chum	
							cases	cases									
1925.....	10	969	50	.....	.....	.....	31,523	7,335	873	25,482	5,107	45	36,717	99,800	66,111	272,993
1926.....	10	1,063	59	.....	.....	.....	83,589	11,774	1,030	20,130	14,036	39	21,787	32,256	88,493	273,134
1927.....	10	1,249	111	.....	.....	.....	57,085	6,553	1,351	10,493	10,621	37	24,079	102,535	67,259	280,013
1928.....	8	1,303	109	.....	.....	.....	26,530	1,173	248	3,661	795	.....	27,061	2,881	193,106	235,455
1929.....	9	1,473	113	.....	.....	.....	60,407	2,984	912	5,977	11,960	53	40,540	158,290	144,208	425,331
1930.....	8	1,523	115	.....	.....	.....	107,896	8,300	3,066	9,761	27,857	22	25,535	30,754	68,946	282,137
1931.....	7	1,358	154	.....	.....	.....	54,688	5,970	1,185	3,187	14,697	4	13,468	21,534	948	115,681
1932.....	8	1,446	166	.....	.....	.....	83,447	19,994	3,622	11,020	16,558	23	28,685	9,813	45,100	218,262
1933.....	10	1,685	110	64	.....	.....	53,481	5,701	426	4,554	13,299	.....	25,715	143,058	77,330	323,564
1934*	11	1,803	98	105	.....	.....	145,579	5,495	263	11,072	22,566	.....	30,751	35,847	219,331	470,904
1934†	.....	.....	.....	.....	.....	.....	133,159	4,713	173	10,760	1,607	.....	10,991	342	103,081	264,826
1935*	10	1,663	124	108	.....	.....	76,415	5,181	326	6,783	7,701	.....	63,933	182,528	72,353	415,220
1935†	.....	.....	.....	.....	.....	.....	57,212	4,205	212	4,984	350	.....	24,600	111,328	8,227	211,118
1936*	11	1,784	118	.....	.....	.....	165,651	7,128	461	8,426	20,647	6	51,243	23,842	188,538	465,942
1936†	.....	.....	.....	.....	.....	.....	164,408	6,680	310	8,142	.....	.....	22,572	2	30,663	232,777
1937*	10	2,082	190	58	.....	.....	103,137	3,877	226	1,940	19,065	15	25,618	252,416	119,254	525,548
1937†	.....	.....	.....	.....	.....	.....	66,883	3,622	84	1,738	1,354	15	11,242	87,897	20,934	193,469
1938*	.....	2,319	190	112	.....	.....	217,882	4,592	413	1,532	21,923	72	54,314	29,862	181,444	512,034
1938†	.....	.....	.....	.....	.....	.....	169,430	3,754	32	508	.....	13	28,687	63	49,835	252,322
1939*	10	2,161	210	.....	.....	.....	73,216	5,092	475	1,511	32,833	86	48,120	204,681	143,020	509,034
1939†	.....	.....	.....	.....	.....	.....	43,294	4,466	448	1,034	8,428	69	17,144	103,605	42,480	225,986

* Represents actual pack, regardless where caught.

† Represents pack of Fraser fish, regardless where canned.

NOTE.—Licences issued include transfers from other districts.

NOTE.—1936† pack of Sockeye on Fraser, 164,408 cases, does not include 16,611 cases Sockeye caught on Fraser and exported and canned in Puget Sound canneries.

STATEMENT No. 6—PACK OF CANNED SALMON OF PUGET SOUND, U.S.A., FROM
1925 TO 1939

Year	Number of canneries operated	Spring	Sockeye	Coho	Chum	Pink	Steel- head	Total
		cases	cases	cases	cases	cases	cases	cases
1925.....	23	23,268	106,064	171,587	41,635	555,848	141	903,543
1926.....	14	27,763	44,569	120,846	112,411	2,125	63	307,777
1927.....	21	43,443	96,343	133,528	37,414	585,506	216	896,450
1928.....	12	24,628	61,044	92,770	145,735	5,816	265	330,258
1929.....	21	32,600	111,855	101,363	150,867	727,748	280	1,124,713
1930.....	13	29,378	352,194	122,691	64,234	3,712	397	572,606
1931.....	18	28,066	83,728	76,025	55,189	705,580	293	948,881
1932.....	10	23,964	78,319	60,740	146,151	1,677	60	310,911
1933.....	19	20,869	125,738	44,568	37,039	543,340	222	771,776
1934.....	20	14,398	352,579	69,254	73,337	3,606	.....	513,174
1935.....	14	9,737	54,677	71,985	15,604	377,445	.....	529,448
1936.....	9	6,328	59,505	29,191½	80,831½	1,345	.....	177,201
1937.....	14	8,968	60,259	32,559	17,417	327,833	.....	447,036
1938.....	13	2,787½	134,651	9,820½	7,852½	193	.....	155,804½
1939.....	14	2,439	43,511	54,773	14,505	275,485	.....	390,713

STATEMENT No. 7—STATEMENT OF HALIBUT LANDINGS—BRITISH
COLUMBIA—1913 TO 1939

(Includes landings in United States bottoms)

	Cwt.		Cwt.
1913.....	223,465	1927.....	271,354
1914.....	214,444	1928.....	302,820
1915.....	194,896	1929.....	304,364
1916.....	123,062	1930.....	254,796
1917.....	113,529	1931.....	182,005
1918.....	186,229	1932.....	168,847
1919.....	210,777	1933.....	170,372
1920.....	238,770	1934.....	182,602
1921.....	325,868	1935.....	171,143
1922.....	293,184	1936.....	168,121
1923.....	334,667	1937.....	187,425
1924.....	331,382	1938.....	193,488
1925.....	318,240	1939.....	222,188
1926.....	315,095		

STATEMENT No. 8—STATEMENT OF DRY SALT HERRING PACKS, 1918-1939—
BRITISH COLUMBIA

Year	District No. 1	District No. 2	District No. 3		Total
			Fast Coast	West Coast	
	cwt.	cwt.	cwt.	cwt.	cwt.
1918.....	20,000	.....	109,900	42,710	172,610
1919.....	4,000	.....	43,000	208,058	255,058
1920.....	807	1	176,640	334,720	512,168
1921.....	249	.....	231,240	248,482	479,971
1922.....	.....	.....	297,871	224,897	522,768
1923.....	.....	8,935	250,420	484,681	744,036
1924.....	.....	.....	305,266	548,277	853,543
1925.....	.....	4,120	591,162	487,892	1,083,174
1926.....	11,134	4,192	596,114	327,207	938,647
1927.....	24,380	7,600	542,385	473,825	1,048,190
1928.....	46,995	.....	748,032	277,161	1,072,188
1929.....	78,800	5,160	691,673	140,751	916,384
1930.....	19,114	.....	546,342	240,517	805,973
1931.....	.....	.....	668,506	119,721	788,227
1932.....	.....	.....	219,398	50,022	269,420
1933.....	.....	.....	448,944	64,080	513,024
1934.....	.....	.....	310,026	104,600	414,626
1935.....	.....	.....	280,290	22,420	302,710
1936.....	.....	.....	357,337	26,000	383,337
1937.....	.....	.....	203,401	.....	203,401
1938.....	.....	.....	149,700	.....	149,700
1939.....	.....	.....	160,315	.....	160,315

STATEMENT No. 9—CANNED PILCHARD PACK—BRITISH COLUMBIA—1917 TO 1939

	Cases		Cases
1917.....	1,090	1929.....	98,821
1918.....	63,693	1930.....	55,166
1919.....	63,065	1931.....	17,336
1920.....	91,929	1932.....	4,622
1921.....	16,091	1933.....	2,946
1922.....	19,186	1934.....	35,437
1923.....	17,195	1935.....	27,184
1924.....	14,898	1936.....	35,007
1925.....	37,182	1937.....	40,975
1926.....	26,731	1938.....	69,473
1927.....	58,501	1939.....	7,300
1928.....	65,097		

STATEMENT No. 10—PRODUCTION FISH OIL AND MEAL—BRITISH COLUMBIA, 1920-1939

Year	From Pilchards		From Herring		From Whales			From Other Sources*	
	Meal and fertilizer	Oil	Meal	Oil	Whale-bone and meal	Fertilizer	Oil	Meal and fertilizer	Oil
	tons	gals.	tons	gals.	tons	tons	gals.	tons	gals.
1920.....					503	1,035	604,070	466	55,669
1921.....								489	44,700
1922.....					326	230	283,314	911	75,461
1923.....					485	910	706,514	823	180,318
1924.....					292	926	645,657	1,709	241,376
1925.....	2,083	495,653			347	835	556,939	2,468	354,853
1926.....	8,481	1,898,721	310	13,700	340	666	468,206	1,752	217,150
1927.....	12,169	2,673,876	1,838	170,450	345	651	437,967	2,512	375,130
1928.....	14,500	3,995,806	831	68,411	376	754	571,914	3,658	411,207
1929.....	15,826	2,856,579	932	34,924	416	779	712,597	3,671	461,915
1930.....	13,934	3,204,058	915	60,373	273	581	525,533	2,420	182,636
1931.....	14,200	2,551,914	3,904	110,810				1,747	241,682
1932.....	8,842	1,315,864	6,195	186,173				413	45,517
1933.....	1,108	275,879	4,078	316,213	249	223	509,310	1,596	187,560
1934.....	7,626	1,635,123	2,570	104,710	340	631	813,724	2,458	337,025
1935.....	8,681	1,649,392	5,262	306,767	211	354	426,772	2,147	247,437
1936.....	8,715	1,217,097	10,985	782,499	332	687	763,740	3,148	335,969
1937.....	8,483	1,707,276	14,427	1,283,658	268	527	662,355	2,720	294,546
1938.....	8,891	2,195,850	9,624	929,158	273	490	543,378	2,491	228,157
1939.....	906	178,305	16,462	1,366,607				3,004	283,504

* Salmon and halibut offal and gray fish.

STATEMENT No. 11—NUMBER OF WHALES LANDED—BRITISH COLUMBIA, 1922-1939*

Species	1922	1923	1924	1925	1926	1927	1928	1929	1930	1933	1934	1935	1936	1937	1938
Sperm.....	38	94	83	76	80	82	83	146	147	190	265	175	311	265	252
Sulphur.....	4	62	56	29	14	10	47	16	10	1	.....	6	3	1	4
Fin.....	94	166	125	135	124	138	140	168	62	17	71	20	48	44	50
Hump.....	50	78	47	40	25	21	21	9	12	.....	14	1	14	7	4
Sci.....	1	53	100	68	25	7	13	67	89	1	.....	.....	2	.....	.....
Right.....	.....	.....	2	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bottlenose.....	.....	2	1	3	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....
Totals.....	187	455	414	351	269	258	305	407	320	209	350	202	378	317	310

* No whaling plants operated 1931, 1932 and 1939.

STATEMENT No. 12—STATEMENT OF FUR SEAL SKINS TAKEN AND LANDED,
BRITISH COLUMBIA, 1912-1939

Year	District No. 2	District No. 3	Total
	No.	No.	No.
1912		205	205
1913	285	119	404
1914	95	257	352
1915	39	400	439
1916	21	138	159
1917	14	204	218
1918	78	10	88
1919	53	17	70
1920	502	556	1,058
1921	270	2,079	2,349
1922	291	639	930
1923	678	3,746	4,424
1924	370	1,862	2,232
1925	810	3,655	4,465
1926	655	2,169	2,824
1927	188	1,288	1,476
1928	465	1,625	2,090
1929	1,119	2,264	3,383
1930	195	2,102	2,297
1931	76	1,387	1,463
1932	88	1,699	1,787
1933	237	1,747	1,984
1934	98	158	256
1935	63	778	841
1936		1,888	1,888
1937		2,671	2,671
1938		1,367	1,367
1939		576	576

STATEMENT No. 13—STATEMENT OF LICENCES ISSUED FOR SALMON CANNERIES AND SALMON
FISHING GEAR (NOT INCLUDING LICENCES TO CAPTAINS AND ASSISTANTS ON SALMON
SEINE-BOATS OR ASSISTANTS ON SALMON GILL-NET BOATS.) BRITISH
COLUMBIA—1927-1939

Kind of Licence	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
<i>District No. 1—</i>													
Salmon cannery	10	10	9	11	7	8	10	11	10	11	10	10	10
Salmon trolling	111	109	113	115	154	166	110	98	124	118	190	190	210
Salmon gill-net	1,249	1,303	1,473	1,523	1,358	1,446	1,685	1,803	1,663	1,784	2,082	2,319	2,161
<i>District No. 2—</i>													
Salmon cannery	48	47	45	26	21	28	29	31	26	27	20	22	18
Salmon trap-net													
Salmon purse-seine	244	158	153	152	71	53	55	109	102	99	82	100	98
Salmon drag-seine	16	9	9	9	9	9	11	9	9	9	9	9	9
Salmon trolling	938	864	738	891	884	875	882	937	930	964	916	958	863
Salmon gill-net—													
Lowe inlet						29	59	67	58	74	76	80	135
Nass river	302	263	246	282	235	278	297	335	310	349	321	309	289
Skeena river	1,198	1,208	1,143	1,202	1,076	1,119	1,218	1,164	1,053	970	856	1,049	844
Rivers inlet	1,273	1,117	1,149	1,449	1,144	1,461	1,603	1,899	1,699	1,802	1,490	1,796	1,550
Smiths Inlet	570	424	428	384	289	293	359	419	324	408	385	465	267
Bella Coola	195	173	236	359	240	238	228	285	268	265	261	242	216
Kimsquit	104	80	194										
Buteedale	108	58	56	71	51	55	43	48	41	57	18	80	102
Namu	180	77	116	142	108	100	107	141	129	145	137	159	148
Queen Charlotte Islands	42	22	3	6	5	4	2	19		24	4	53	9
Total, salmon gill-net, Dis-													
trict No. 2	3,972	3,422	3,571	3,895	3,148	3,577	3,916	4,377	3,882	4,095	3,548	4,233	3,560
<i>District No. 3—</i>													
Salmon cannery	18	19	17	17	7	8	10	7	7	8	7	6	7
Salmon trap-net	7	7	7	7	7	7	8	8	8	7	5	5	5
Salmon purse-seine	308	239	218	191	157	104	183	187	191	188	209	200	241
Salmon drag-seine	30	13	13	12	12	21	20						
Salmon trolling	2,045	2,014	1,779	2,109	2,077	1,992	1,888	2,034	2,053	2,429	2,056	2,305	2,874
Salmon gill-net	422	454	565	643	387	336	512	646	673	741	466	573	781
<i>Whole Province</i>													
Salmon cannery	76	76	71	54	35	44	49	49	43	46	37	38	35
Salmon trap-net	7	7	7	7	7	7	8	8	8	7	5	5	5
Salmon purse-seine	552	397	371	243	228	157	236	296	293	287	291	300	339
Salmon drag-seine	46	22	22	21	21	30	31	9	9	9	9	9	9
Salmon trolling	3,094	2,987	2,630	3,115	3,115	3,033	2,880	3,099	3,107	3,511	3,162	3,453	3,947
Salmon gill-net	5,643	5,179	5,609	6,061	4,893	5,359	6,113	6,826	6,218	6,620	6,096	7,125	6,502

NOTE.—During the season 1928 F. Millerd's cannery at Vancouver, the Cassiar cannery on the Skeena and the Massett Cannery, Massett inlet, operated without licences, and are not included in the number of cannery licences shown above.

Commencing with year 1930 salmon cannery licences shown above were issued by the Provincial Fisheries Department.

DEPARTMENT OF FISHERIES

STATEMENT No. 14—STATEMENT OF POWER BOATS OPERATED IN DISTRICT No. 2, BRITISH COLUMBIA, IN CONNECTION WITH SALMON GILL-NET OPERATIONS

—	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
Naas river...	3	9	35	21	37		119	142	179	233	268	243	327	278	287	276
Skeena river.	18	64	133	162	216	263	472	603	660	668	732	804	842	824	817	806
Bella Coola																
Kimsquit..	1	12	49	47	90	103	70	124	94	89	101	150	150	139	161	207
Central area.....		8	28	87	13		73		68	111	165	234	161	252	244	323
Rivers inlet..	54	110	254	248	479	435	712	682	776	901	1,233	1,164	1,287	1,122	1,294	1,235
Smiths inlet..	9	39	131	110	204	135	231	176	175	219	299	285	302	328	387	325
Queen Charlotte Islands					10								24			10
	85	242	630	675	1,049	1,010	1,658	1,765	1,990	2,287	2,922	2,807	3,173	2,957	3,277	3,281

STATEMENT No. 15—PACK OF SOCKEYE SALMON FROM RUNS TO FRASER RIVER, 1925-1939

Year	Fraser River Pack *	Canadian Traps in Juan de Fuca Straits	Puget Sound Pack	Total Cases
1925.....	31,523	3,862	106,064	141,449
1926.....	83,589	2,091	44,569	130,249
1927.....	57,085	4,337	90,343	157,765
1928.....	26,530	2,769	61,044	90,343
1929.....	60,407	3,480	111,856	175,743
1930.....	93,416	5,334	352,194	450,944
1931.....	38,507	2,440	83,728	124,675
1932.....	61,769	4,000	78,319	144,088
1933.....	43,745	8,721	125,738	178,204
1934.....	133,159	6,117	352,579	491,855
1935.....	57,212	5,610	54,677	117,499
1936.....	164,408	3,837	59,505	227,750
1937.....	66,583	6,152	60,259	132,994
1938.....	169,430	3,784	139,173	312,387
1939.....	43,249	4,290	43,511	91,050

* For the years 1925 to 1929 inclusive, figures represent sockeye pack at Fraser River canneries, regardless where caught. From 1930 onwards, figures represent pack of Fraser River sockeye, regardless where canned.

STATEMENT No. 16—STATEMENT OF FISHERY LICENCES ISSUED—BRITISH COLUMBIA—SEASON 1939-1940

Variety of Licence	Issued				Transfers				Operating				Total
	White	Ind.	Others	Jap RS.	Can- celled	Total	White	Ind.	Jap RS.	Others	Jap RS.	Can- celled	
Salmon Trap-net.....	5	9				5							5
Salmon Drag-seine.....						9							9
Salmon Purse-seine.....	269	59			1	329						1	329
Salmon Gill-net.....	2,960	1,202	912	44	87	5,205	991	289	17	1,297	912	61	87
Salmon Trolling.....	3,150	552	155	3	9	3,869	78			78	155	3	9
Asst. Salmon Gill-net.....	111	300	270	1	56	3,000				300	270	1	56
Capt. Salmon seine.....	84	119				203				84	119		
Asst. Salmon seine.....	1,026	808				1,834				1,026	808		
Abalone.....	2	4	2			8				2			
Cod.....	291	28	152	1	16	488				291	152	1	16
Crab.....	82	25	2	1		110				82	25	1	
Grayfish.....	95	12	258			365				95	12		
Miscellaneous.....	68	5	33	6	2	114				68	33	6	2
Small Dragger.....	37		10			47				37	10		
Smelt.....	30		18			48				30	18		
Capt. Tuna fishing boat.....	17					17				17			
Asst. Tuna fishing boat.....	78					78				78			
Capt. Halibut boat for bait.....	18					18				18			
Herring Pound.....	12	1				13				12			
Herring Purse-seine.....	52	2	2		2	58				52	2	2	
Herring Gill-net.....	26	1	9			36				26	1	9	
Capt. Herring seine.....	34	5	4			43				34	4		
Asst. Herring seine.....	352	89	75			516				352	89		
Pilchard Purse-seine.....	28					28				28			
Capt. Pilchard seine.....	26					26				26			
Asst. Pilchard seine.....	168					168				168			
Totals.....	9,021	3,221	1,902	56	173	14,373	1,069	289	17	1,375	1,902	73	173

LICENCES ISSUED BY PROVINCIAL FISHERIES DEPARTMENT

Indian permits..... 1,932

Pilchard Cannery..... 1

Cold Storage plants..... 10

Herring Dry Saltery..... 5

Salmon Cannery..... 35

Shellfish Cannery..... 6

Pilchard Reduction..... 13

Degfish and offal reduction plants..... 11

Commercial Fishery licences for non-tidal waters:—Fur farmers..... 86

Ordinary..... 87

Sturgeon..... 2

STATEMENT No. 17—STATEMENT OF NUMBERS OF DIFFERENT SPECIES OF SALMON AND METHOD OF CAPTURE, REPORTED BY OPERATORS OF SALMON PURSE-SEINES, DRAG-SEINES, AND TRAP-NETS, AND BY SALMON CANNING, CURING, AND COLD STORAGE ESTABLISHMENTS, OF GILL-NET AND TROLL CAUGHT FISH, BRITISH COLUMBIA—1939

—	Sockeye	Springs	Blue-backs	Steelhead	Coho	Pink	Chum	Total
Troll.....	2,208	117,450	695,025	101	589,054	16,903	1,086	1,421,827
Gill-net.....	3,590,585	211,247	4,738	41,115	729,353	3,585,904	421,956	8,584,898
Purse-seine.....	384,298	13,238	457	2,228	309,497	5,049,979	2,121,743	7,881,440
Drag-seine.....	51,743	.....	.....	.....	10,281	10,282	5,283	77,589
Trap-net.....	52,693	19,027	.....	25	43,196	169,049	1,671	285,661
Totals.....	4,081,527	360,962	700,220	43,469	1,681,381	8,832,117	2,551,739	18,251,415

STATEMENT No. 18—STATEMENT OF NUMBER OF SALMON CAUGHT BY PURSE-SEINES, SHOWN BY SEINING AREAS, SEASON—1939

Area	Sockeye	Spring	Blue-back	Steelhead	Coho	Pink	Chum	Total
1.....	.....	.....	.....	.....	225	.....	71,372	71,597
2.....	3	.....	.....	.....	7,974	31,608	239,870	279,455
3.....	5,132	522	25	11	2,355	379,636	18,916	406,597
4.....	20	.....	.....	.....	14	7,167	3	7,204
5.....	43,551	144	6	33	20,528	272,162	23,115	359,539
6.....	30,553	589	.....	46	24,871	597,764	101,295	755,118
7.....	3,046	89	.....	110	7,753	320,675	195,000	526,673
8.....	1,133	37	.....	69	4,060	130,771	18,827	154,897
9.....	2	3	.....	.....	200	404	13,163	13,772
10.....	106	9	.....	3	880	27,803	16,021	44,822
11.....	5,146	58	160	36	4,190	55,054	7,017	71,661
12.....	132,802	5,581	266	759	100,747	1,883,760	246,539	2,370,454
13.....	34,902	2,406	.....	188	57,667	682,848	475,680	1,253,691
14.....	3	10	.....	1	2,751	30,707	89,409	122,881
15.....	.....	.....	.....	.....	107	.....	1,934	2,041
16.....	45	6	.....	.....	1,693	129,722	40,674	172,140
17.....	.....	.....	.....	.....	.....	.....	.....	.....
18.....	89,053	1,701	.....	143	4,350	481,033	7,409	583,689
19.....	.....	.....	.....	.....	.....	.....	.....	.....
20.....	.....	.....	.....	.....	.....	.....	.....	.....
21.....	30	354	.....	1	22,681	4,867	6,726	34,659
22.....	.....	4	.....	.....	11,413	.....	149,179	160,596
23.....	4,730	1,583	.....	152	9,344	45	174,712	190,566
24.....	32,467	90	.....	671	8,687	4,200	51,711	97,826
25.....	.....	.....	.....	.....	6,487	.....	79,384	85,871
26.....	434	.....	.....	.....	3,252	.....	29,656	33,342
27.....	1,140	52	.....	5	7,268	9,753	64,131	82,349
Totals.....	384,298	13,238	457	2,228	309,497	5,049,979	2,121,743	7,881,440

STATEMENT No. 19—STATEMENT SHOWING PACKS OF CANNED SALMON, 1932-1939
WITH QUANTITIES GRADED SECOND QUALITY AND PERCENTAGES

—	Sockeye	Springs	Steel- head	Blue- back	Coho	Pinks	Chum	Total
1932 Pack, cases.....	284,355	76,060	1,168	28,505	160,466	223,716	306,761	1,081,031
Grade B, cases.....	3,355	1,234	.....	164	333	119	3,083	8,288
Per cent.....	1-179	1-622	.....	-575	-207	-053	1-005	-766
1933 Pack, cases.....	258,107	20,266	1,459	21,763	137,289	532,558	293,630	1,265,072
Grade B, cases.....	494	.....	.....	10	873	15,149	887	17,413
Per cent.....	-191	.....	.....	-045	-635	2-844	-302	1-376
1934 Pack, cases.....	377,882	29,784	1,282	29,556	195,874	435,364	513,184	1,582,926
Grade B, cases.....	21,620	139	5	.....	962	4,085	1,127	27,938
Per cent.....	5-721	-466	-390	.....	-491	-938	-219	1-764
1935 Pack, cases.....	350,444	21,920	596	15,319	216,173	514,966	409,604	1,529,022
Grade B, cases.....	3,435	659	.....	.....	3,840	20,528	5,601	34,063
Per cent.....	-980	3-006	.....	.....	1-776	3-986	1-367	2-227
1936 Pack, cases.....	415,024	29,854	1,068	33,718	212,343	591,532	597,487	1,881,026
Grade B, cases.....	13,725	.....	.....	.....	483	29	5,265	19,502
Per cent.....	3-307	.....	.....	.....	-227	-005	-881	1-036
1937 Pack, cases.....	325,774	16,171	844	19,236	113,972	585,576	447,602	1,509,175
Grade B, cases.....	65	.....	.....	.....	68	27,282	3,212	30,627
Per cent.....	-019	.....	.....	.....	-059	4-659	-717	2-029
1938 Pack, cases.....	447,453	15,531	1,035	27,417	273,906	400,876	541,812	1,707,830
Grade B, cases.....	16,361	.....	.....	56½	1,111	1,413	1,583	20,524½
Per cent.....	3-656	.....	.....	-206	-405	-352	-292	1-201
1939 Pack, cases.....	269,593	16,097	797	48,209	196,307	619,947	385,565	1,536,515
Grade B, cases.....	3,165½	11	20	17	142½	45,606½	1,068	50,030½
Per cent.....	1-339	-068	2-509	-035	-072	7-356	-276	3-256

SPAWNING REPORT—1939

Due to the unusually keen demand for salmon, as the result of war conditions, particular attention was required during this season to see that proper escapements of the several varieties of salmon were permitted. The situation, however, was considerably assisted by the unusually heavy fall rains over most of the British Columbia coast. This resulted in larger percentages of the runs passing to the spawning grounds, as, owing to the streams being full of water, the salmon were not obliged to wait near the mouths for better conditions. This situation applies particularly to the chums.

The heavy rains resulted in the scouring of spawning beds in some areas and it is quite probable that considerable damage has been done in some streams which will require attention in the next cycle years.

The unusually wet weather brings further problems in the way of obstructions in streams. The higher the water the greater the quantity of logs and other debris passing downstream, with the danger of forming impassable obstructions to the ascent of salmon. However, with the present system of annual inspection of all salmon streams by the local officers, with a view to obtaining information as to the adequacy of the spawning, and the presence of obstructions in the streams, and with the facilities for the removal of any obstructions found, it is expected that all situations of this nature will be adequately dealt with at the proper time.

A detailed report covering the several areas follows:

Queen Charlotte Islands.—The very small run of sockeye to this area again made its appearance. It is not of commercial value, however.

The pink supply on the spawning grounds was found to be light compared with previous years. This was an "off season" for pinks in the Queen Charlottes and the escapement was expected to be small.

The supply of chums generally was found to be disappointing, although the run to Massett Inlet was unexpectedly heavy.

Naas Area.—The early seeding of sockeye is reported as heavy in the Meziaden Lake area, the main spawning ground, all shores of the lake being well covered with spawning fish and numbers showing in the lake. The supply of the late run was also good. The total sockeye spawning was very satisfactory.

The early run consists of fish observed on and in the vicinity of the spawning grounds in the lake, whilst the late run is that observed still proceeding up Meziaden River at the time of the inspection.

There was a light supply of spring salmon found and the coho were only commencing to arrive at the time of the inspection.

The fishway was found to be in good condition, although the cribbing showed some signs of decay.

The officer who inspected the lower reaches of the river system states that the escapement of sockeye was heavier than in either 1934 or 1935, when the runs were large. The pink spawning was good for an "off year." The supply of cohoes and chums was found to be small and the springs fair.

The runs to the Naas River watershed of the several varieties, particularly the sockeye, have shown an improvement in recent years, and the watershed is in splendid condition.

Skeena Area.—The local inspector states that there is no question but that there has been one of the greatest escapements of sockeye in the Babine Lake and River sections of the spawning grounds, this year, as has been experienced for nearly a decade. This also applies to the escapement of pinks on the Babine River. The springs have also been very satisfactory but the supply of cohoes was found to be light. The inspector calls attention to the predominance of female sockeye and also to the fact that until the arrival of the later runs the fish were individually large. Speaking generally, the area has received a heavy seeding of sockeye.

Upper and Lower Babine River obtained a very heavy run of pinks, comparing favourably with other heavy runs in the experience of the inspecting officer:

Lakelse Lake system is well supplied with sockeye, the quantity observed being greater than in the cycle year of 1935. The pink seeding is also reported as good.

In the Ocostall River system there was a medium run of sockeye, a heavy run of pinks, a medium run of chums, and a light supply of cohoes. The spring salmon spawning in Johnson Creek was very good.

There is no doubt that the lowering of the fishing boundary on the Skeena River some seven miles, four years ago, is obtaining the results desired in the way of increased escapement.

Lowe Inlet Area.—A fairly heavy seeding of sockeye was obtained in most of the streams in this subdistrict, comparing favourably with that of the cycle year. Wet weather conditions permitted a good escapement.

The coho seeding was not satisfactory and this condition exists also in the case of chums, although to a greater degree.

Although an "off year" for pinks, the seeding of this variety was larger than expected and better than that of the brood year of 1937.

Butedale Area.—Not an important sockeye area but the escapement was satisfactory. Good quantities of coho were observed and a fairly heavy escapement of pinks, notwithstanding that this was the light cycle. The chum supply was unsatisfactory.

Bella Bella Area.—In the case of sockeye the conditions were similar to those obtaining in the brood year of 1935, when the supply found was quite light, apart from the east and west Tuno river which received heavy seedings.

The escapement of cohoes, generally speaking, is reported as being light, although good catches were made off shore. In the Kildidt Sound and Gull Chuck Inlet areas the supply on the spawning grounds was good.

In the case of pinks the escapement is considered satisfactory, as the result of special curtailment of fishing for the purpose of building up this cycle.

The chum escapement is reported as being only of medium intensity, apart from the Gull Chuck River, where there was a heavy late seeding.

Spring salmon and steelhead trout do not spawn in the Bella Bella area in commercial quantities.

Bella Coola Area.—Due to fewer fishermen operating at the first of the season, the percentage of escapement of sockeye was greater than usual and although the run generally was not heavy, yet the spawning grounds were adequately seeded. The supply of springs is reported by the inspecting officer as the heaviest in his experience, which covers the past nineteen years. The escapement of cohoes was good, and equal to expectations. A very heavy run of pinks was found, fully equal to the splendid run of 1937. The chum escapement was below average.

Rivers Inlet Area.—The inspecting officer reports that the sockeye escapement in this area was at least an average one and practically on a par with the cycle year of 1934, but not as great as the good year of 1935.

The Quap, Genesi, Whonnock, and Waukwash rivers are reported as being exceptionally well seeded, bearing in mind the small commercial catch. Conditions observed in the other streams were not nearly so satisfactory, however, although, due to high water conditions, there was great difficulty in seeing the salmon. The inspecting officer observes that from Quap river to the old hatchery, a distance of six miles, on October 26th sockeye which had not yet passed to the spawning streams were observed in considerable quantities, which leads him to believe that some of the fish at least were later than usual in ascending to the spawning areas. The fish were unusually small in size and no doubt a considerable portion of the run passed through the nets. The unusually unfavourable fishing weather during the early weeks of fishing assisted the escapement also.

This is not a large pink area but the supply found was better than usual. The coho and chum seeding, however, was disappointing.

Smiths Inlet Area.—High water in this area also interfered with observations of salmon and the number observed on the spawning grounds was considerably less than the average. The inspecting officer, however, feels that the number of sockeye was larger than could be seen under the difficult conditions of high water. In view of the escapement during recent years and the protective measures taken, there appears to be no reason why there should be any failure in this area.

The escapement of spring salmon was normal, the pink supply heavy, but the supply of cohoes and chums light.

FRASER RIVER WATERSHED

Conditions in recent previous cycle years did not justify expectations of any material quantity of sockeye, particularly in the upper reaches of the Fraser River system.

Prince George Area.—Compared with recent years Kynoch Creek sockeye supply showed considerable improvement. This also applies to the Stellaco river. Other streams showed very few sockeye. Spawning of springs in the Stuart River system was satisfactory and has shown continued improvement in recent years.

Quesnel Area.—Approximately 2,500 sockeye were found on the Bowron River beds, which compares favourably with recent seasons. There was a small increase in the number of sockeye spawning in the Chilco Lake system, although this was an "off year." The increase, no doubt, is largely due to the arrangements this year whereby the Indians took no sockeye salmon from the Chilco river on their way to the spawning grounds of this system. The supply of springs was lighter than usual.

Kamloops Area.—At Raft river, tributary to the North Thompson, sockeye were found in larger quantities than in the brood year. At Little river conditions were found comparable with those of the brood year of 1935, and are satisfactory. In Adams river, however, the spawning was considerably lighter than that of the brood year. The spring salmon seeding was favourable in the North and South Thompson River system. Cohoes were found in satisfactory quantities in the Adams Lake area. No salmon of any variety were found in Scotch creek.

Pemberton Area.—The sockeye spawning was disappointing, the quantity of fish found being approximately fifty per cent of that of the brood year. The seeding of springs was light but the coho run was reasonably satisfactory.

Hope Area.—The streams in this area obtained an average supply of the several varieties of salmon usually found. Conditions at Hell's Gate were satisfactory with the result that salmon were not unduly delayed in their passage at this very difficult point.

Chilliwack Area.—The usual small run of sockeye appeared in Chilliwack lake but the return to Cultus lake totalled approximately 72,000 fish compared with 15,000 in the brood year of 1935. The supply of springs was found to be light but there was a satisfactory quantity of pinks, with a particularly heavy seeding in Sweltzer creek and other nearby tributaries. The coho supply was not better than average. The chum run to Sweltzer creek is reported as heavy, but light in other portions of the district.

Harrison Lake Area.—Morris creek seeding of sockeye was reasonably satisfactory. Small quantities only, however, were found in other portions of the area. The supply of springs was light but the largest supply of pinks observed in years was found. The chum supply is reported as being unusually light, except in Squak creek where a heavy seeding occurred.

Pitt River Area.—The sockeye spawning was found to be only fairly satisfactory. This also applies to the springs and chums. The pink run, however, was found to be one of the heaviest in the last ten years. The coho seeding was only reasonably satisfactory but these fish continue to enter the streams for several months following inspection.

Lower Fraser Area.—The Nicomekl and Serpentine rivers, which are primarily coho streams, were satisfactorily seeded.

North Vancouver Area.—A heavy run of cohoes spawned in Indian and Capilano rivers, and Seymour creek. The supply in Lynn, Mission, and McKay creeks, which are considerably smaller streams, was light. The pink supply in Indian and Capilano rivers and Seymour creek was very satisfactory. Chum salmon appeared in the streams in this area in considerably reduced numbers compared with recent years, apart from Indian river, where the seeding was satisfactory.

Squamish Area.—The coho run well into February but indications would seem to show an average supply. Chums, however, were found to be less numerous than for a number of years and the seeding cannot be considered even reasonably satisfactory. A substantial run of spring salmon spawned in this area.

Alert Bay Area.—The Nimpkish area, the principal sockeye spawning district, was well seeded, notwithstanding the comparatively light catch commercially. Fair supplies were found in the streams draining into McKenzie Sound, at Shushartie and Nahwitti rivers. Keough River beds were only lightly seeded, however. This also applies to the Port Neville and Thompson Sound portions of the district.

Nearly all streams were well supplied with spring salmon. Whilst the supply of cohoes was not as great as that of the unusually large preceding year, the seeding, generally speaking, was satisfactory. The pink supply showed an increase over the brood year of 1937, heavy runs appearing at Wakeman river, Adams river, Glendale Cove, Kwatsie and Klucksivi rivers. Large supplies of chums were observed in Wakeman Sound, Knight Inlet, Adams river, and the Salmon Arm portion of Seymour Inlet, as well as Viner Sound.

Quathiaski Area.—There was a large escapement of sockeye at Phillips Arm river than ever before seen by the local inspector at this point. The Hayden Bay escapement was only fair. The spring supply was better than that of the previous year when a good escapement was observed. This also applies to the coho variety. For an "off year" for the pink species the seeding was found to be quite satisfactory. The chum supply cannot be considered as up to expectations.

Comox Area.—A satisfactory supply of springs was found on the spawning grounds, particularly in the Puntledge river. Good supplies of coho were also found throughout the Comox district generally, apart from Puntledge river. The pink return was considered satisfactory, in view of this being an "off year." There was a particularly heavy run to Tsolum river which showed a heavy increase over the seasons of 1937 and 1938. An adequate supply of chums was observed in all the main spawning streams, particularly the Qualicum rivers.

Pender Harbour Area.—The only sockeye stream of any importance is Saginaw creek but the spawning was not up to expectations. An average spawning of springs was observed and an adequate supply of cohoes. Pinks were abundant in the larger streams, although some of the smaller ones were poorly seeded. The chum supply was disappointing although the percentage of the runs escaping to the spawning grounds was high, due to high water conditions.

Nanaimo Area.—A good average seeding of springs was found. A good supply of cohoes was also found on the spawning grounds, although not equal to last year's abnormally large seeding. The usual light run of pinks again occurred. The chum seeding was not as good as might be desired.

Ladysmith Area.—The usual light seeding of springs and quite a satisfactory supply of coho was found on the spawning grounds. The usual few pinks also arrived but the chums were disappointing.

Cowichan Area.—A good average supply of springs, a satisfactory quantity of cohoes, and an adequate supply of chums occurred, although the quantity of the latter was not as large as expected. A better supply of steelhead trout was observed on the spawning beds.

Victoria Area.—A good supply of cohoes was observed, although the chum seeding, while being adequate, was not as great as expected.

Alberni Area.—The systems frequented by the sockeye are the Somass River, Stamp River, Anderson Lake in Barclay Sound, and Hobarton Lake in Nitinat Arm. Spawning conditions in the area under review were found to be very satisfactory and the escapement was good. The fish ladder at Stamp Falls operated successfully, although, due to high water, many of the salmon passed safely over the main falls.

Generally speaking, the supplies of spring salmon were satisfactory, with the seeding in the Somass and Nahmint rivers being heavy. The Nitinat supply was disappointing. The coho spawning was excellent, although not quite as good as in the unusually satisfactory year of 1938. The only pink stream of any particular value is the San Juan River where a normal seeding occurred. A satisfactory quantity of chums was observed on the spawning grounds, although smaller than in some of the recent years.

Clayoquot Area.—An adequate seeding of sockeye occurred in the Kennedy Lake system, which is the principal spawning area of this species. A normal escapement was also observed in Medgin River. The supply of springs found this year and in recent seasons on the spawning grounds leads the local inspector to observe that the number of this variety has increased in recent seasons. The coho supply was found to be excellent. There is no run of pink salmon, of any value, to the Clayoquot area. The chum seeding may be considered as satisfactory, as, due to high water conditions, a larger proportion of the runs passed to the spawning grounds.

Nootka Area.—The usual light run of sockeye was found at Gold River and several other small streams. A normal escapement of springs and an average supply of coho was found. The chum seeding is considered adequate.

Kyuquot Area.—The usual small supply of creek sockeye was found on the spawning grounds, although this run is not of particular value. The escapement of springs was satisfactory and that of cohoes fair. The pinks do not run in commercial quantities in this district. The chum supply was fair.

Quatsino Area.—A good average run occurred to Mahatta River, which is the only sockeye stream carrying a run of commercial value. The spring seeding was above the average and the cohoes well up to average. The pink supply compares favourably with recent seasons. The chum seeding was found to be only fair.

APPENDIX No. 2

ANNUAL REPORT ON FISH CULTURE

By J. A. RODD, DIRECTOR, FISH CULTURE BRANCH

Fish cultural operations of the Department of Fisheries were confined to those provinces in which it administered the fisheries, namely, Nova Scotia, New Brunswick and Prince Edward Island. In addition over 1,000,000 sockeye salmon eggs were planted in Hillier Creek, Maggie Lake, Vancouver Island, in continuation of the stocking effort, resumed in 1937, to add these waters to the sockeye producing areas of the Barclay Sound district.

The total output from the hatcheries operated by the department in 1939 was 34,253,335. Over 75 per cent of this output was distributed in the fingerling and older stages. The numbers of each species distributed were:

STATEMENT BY SPECIES OF THE FISH AND FISH EGGS DISTRIBUTED FROM THE HATCHERIES DURING THE YEAR ENDED DECEMBER 31, 1939

Species	Fyed Eggs	Fry	Advanced Fry	Fingerlings	Yearlings and Older	Total Distribution
Salmo salar-Atlantic salmon.....		835,000	5,422,700	15,072,425	1,500	21,331,625
Salmo rivularis Kamloops-Kamloops trout.....				8,250	120	8,370
Salmo irideus-Rainbow trout.....				308,360	3,833	312,193
Salmo salar sebago-Sebago salmon.....					10,295	10,295
Salvelinus fontinalis-Speckled trout.....		253,000	820,000	10,396,006	91,016	11,560,022
Oncorhynchus nerka-Sockeye salmon.....	1,030,830					1,030,830
	1,030,830	1,088,000	6,242,700	25,785,041	106,764	34,253,335

The following classification of eggs, fry and fingerlings applies to all statements and references in this report:—

Green Eggs.—Eggs until they are "eyed."

Eyed Eggs.—Eggs showing the eyes of the developing fish.

Fry.—Fish from date of hatch until free-swimming with the food sac fully absorbed. (No fry are distributed until the sac is fully absorbed.)

Advanced Fry.—Fry that are feeding systematically.

No. 1 Fingerlings.—Fish that are feeding from two to eight weeks.

No. 2 Fingerlings.—Fish that are feeding from eight to fourteen weeks.

No. 3 Fingerlings.—Fish that are feeding from fourteen to twenty weeks.

No. 4 Fingerlings.—Fish that are feeding from twenty to twenty-six weeks.

No. 5 Fingerlings.—Fish that are feeding from twenty-six weeks to one year from date of hatch.

Thirteen main hatcheries, one subsidiary hatchery, six rearing stations, seven salmon-retaining ponds and several egg-collecting stations were operated in 1939. The output therefrom was as follows:—

THE FOLLOWING TABLE SHOWS THE HATCHERIES OPERATED, THEIR LOCATION, DATE OF ESTABLISHMENT, THE SPECIES AND THE NUMBER OF EACH SPECIES DISTRIBUTED FROM EACH HATCHERY DURING 1939

Estab- lished	Hatchery	Location	Species	Eyed eggs	Fry	Advanced fry	Fingerlings					Year- lings and Older	Total distrib- ution by species hatcheries	Total distrib- ution by species hatcheries
							No. 1	No. 2	No. 3	No. 4	No. 5			
1929	Antigonish.....	St. Andrews, N.S....	Atlantic salmon...			355,000	900,000	135,000	6,230				1,398,230	
			Rainbow trout.....				1,580,000	31,225				9,632	37,225	
1876	Bedford.....	Bedford, N.S....	Speckled trout.....			140,000	482,740	31,000			2,538		1,690,770	3,114,425
1937	Cobequid.....	Jackson, N.S....	Speckled trout.....				626,340						426,340	1,249,080
1938	Coldbrook (f).....	Coldbrook, N.S....	Atlantic salmon.....			250,000	1,005,000	224,000	102,000	30,700		50,800	1,493,000	2,357,500
1936	Grand Lake (f).....	Wellington Station, N.S.	Speckled trout.....				435,000		20,838				20,838	
			Rainbow trout.....					10,000	21,000	68,135			41,005	110,000
			Atlantic salmon.....						400,000	7,000		10,295	9,560	
1937	Kejimikujik (f).....	New Grafton, N.S....	Speckled trout.....				100,000		200,000			9,900	300,000	437,355
1912	Lindloff.....	St. Peters, N.S....	Atlantic salmon.....				43,000	97,000	4,000	1,010			77,010	377,010
			Atlantic trout.....				385,000	508,222					893,192	
1902	Margaree.....	N. E. Margaree, N.S.	Rainbow trout.....				653,418	83,000	78,138	16,995			917,670	1,894,725
1935	Mersey River (f).....	Liverpool, N.S....	Speckled trout.....			1,400,000	995,000	289,000	135,000	103,146		3,053	2,915,146	
1913	Middleton.....	Middleton, Amnapolis Co., N.S.	Atlantic salmon.....				943,766	335,832	130,000	190,000	127,763		1,770,434	4,685,580
			Atlantic trout.....				72,500	135,000	106,100				106,100	106,100
1933	Nictaux Falls (f).....	Nictaux Falls, N.S....	Rainbow trout.....			25,000	209,000	18,000	321,000	55,000			38,000	1,531,100
1929	Yarmouth.....	South Ohio, N.S....	Atlantic salmon.....		300,000	35,000	308,000	465,000				1,500	323,000	333,000
			Klamloops trout.....				8,250		19,500				356,000	
1939	Charlo.....	River Charlo, N.B....	Rainbow trout.....			650,000	501,206	15,000	20,000	9,200		3,833	696,700	1,084,903
1928	Florenceville.....	Florenceville, N.B....	Atlantic salmon.....				1,140,000	2,235,379				2,500	1,796,673	1,856,320
1880	Grand Falls.....	Grand Falls, N.B....	Speckled trout.....			50,000	906,162		55,645				50,645	
1874	Miramichi.....	South Esk, N.B....	Atlantic salmon.....			20,000	1,682,500	95,500			3,484	13,011	2,116,162	2,845,657
			Speckled trout.....	206,000		20,000	1,597,100	713,000	134,715				4,577,715	
			Atlantic salmon.....			2,278,800	1,192,900	184,455	288,345				1,251,502	3,709,220
1914	St. John.....	St. John, N.B....	Speckled trout.....				183,400	18,300					3,537,155	
1938	Cardigan (f).....	Cardigan, P.E.I....	Atlantic salmon.....			45,000	885,000			28,180		2,060	1,403,180	3,688,855
1906	Kelly's Pond.....	Southport, P.E.I....	Speckled trout.....			325,000	617,000	46,680					88,900	2,238,920
1911	Anderson lake (a).....	Anderson Lake, Kildonan, Manitoba, B.C.	Rainbow trout.....			398,900	136,800	55,300					537,040	625,340
			Speckled trout.....			2,000	239,605	12,010	266,000	134,240			723,900	
			Sockeye salmon.....	(e) 1,030,830									253,615	977,515
													1,030,830	1,030,830
				1,030,830	1,088,000	6,242,700	16,383,475	5,955,537	2,666,638	645,606	133,785	106,764	34,253,335	34,253,335

(a) Secondary hatchery.

(f) Rearing station.

(e) Autumn collection 1939.

The eggs, fry and fingerlings included in this distribution, with the exception indicated, were from collections in the autumn of 1938 and the spring of 1939.

The eyed sockeye eggs, which were collected at Anderson Lake, were planted in excellent condition at Maggie Lake, Alberni Canal, British Columbia, under rather difficult conditions caused by heavy rainfalls. All streams tributary to the lake were in flood and the lake itself was from two to three feet above normal level. The eggs were necessarily retained on board the boat until water levels had reached a stage where they might be planted in previously selected locations which would not be uncovered when the flood water receded.

Four thousand, eight hundred and seventy-five Atlantic salmon were obtained for fish cultural purposes and retained at the various retaining ponds operating in the Maritime Provinces. Three thousand three hundred and forty-two were purchased from fishermen and 1,533 were taken in departmental traps. The average weight of the salmon impounded at each pond was: Margaree, 11·6; River Philip, 12·3; Sackville River, 4; Miramichi, 8·7; New Mills, 15·9; Benjamin and Jaquet Rivers, 7·1; St. John, 10·5; Morrell, 8·6. Nineteen million, nine hundred and twenty-eight thousand two hundred and eighty salmon eggs were secured.

Last year's record collection of speckled trout eggs from hatchery pond fish was exceeded by over 921,000 eggs. This increase is largely due to collections made from the Cobequid and Lindloff hatchery ponds and to collections at Spears, Trout and Tweedie's Meadow brooks, New Brunswick. Small increases over the previous year in numbers collected were made at the Margaree hatchery and at Sand Lake (Middleton hatchery).

Over 80,400 Atlantic salmon fingerlings, the progeny of "early" salmon of the New Mills district, New Brunswick, were marked by the removal of the adipose and either the right or left pectoral fins and distributed from the Grand Falls and Florenceville hatcheries in the St. John River and tributaries, bringing the total distribution of such marked fish in these waters from 1935-1939 inclusive to 278,500, in the hope of gaining further information in regard to the influence of "environment vs. heredity" on Atlantic salmon. During this five-year period over 726,400 fingerling, yearling and two-year-old Atlantic salmon, with the adipose and one other fin removed, have been distributed in the streams of the Maritime Provinces. The recapture of these marked salmon, if reported, should add to present data in regard to the "homing" theory, sea movements or migrations of this species.

A spring salmon (*Oncorhynchus tshawytscha*), 29½ inches long and 12½ pounds in weight, was taken near Saint John, New Brunswick. Spring salmon have been planted in the past in the St. John River and its tributaries but their occurrence in that stream has not been reported for many years. The specimen in question is most likely due to more recent distributions that have been made in Atlantic Coast streams of the United States.

Encouraging reports of improved trout angling have been received from many districts where hatcheries are operating. Marked trout, distributed from the Antigonish hatchery, have been taken by anglers in considerable numbers and similarly marked trout have been reported from other districts in the Maritime Provinces. A small run of Atlantic salmon appears to have been firmly established in the Cardigan River, Prince Edward Island. This stream was first stocked with salmon fry in 1921. In so far as is known salmon had not previously been found there. Six years after the first stocking, when adult salmon were due to return, a good number resorted to this stream and have since continued to do so every year.

In collaboration with the director and staff of the Atlantic Biological Station, (St. Andrews, New Brunswick) of the Fisheries Research Board, the management of eight lakes (Gibson, Welch, Limeburner, Bonaparte, Johnson, Kerr, Crecy and St. Patrick) in Charlotte County, New Brunswick, was undertaken. The management calls for (1) the stocking with trout, closure until the fish are three years old and then opening to angling in such a manner that

after the plan is in operation four of the lakes will be open to fishing every year, (2) the maintenance of an adequate patrol to prevent illegal angling, (3) the planting of three sizes of trout, namely, No. 2 fingerlings, No. 5 fingerlings and yearlings, as a test of the relative value of these sizes for the stocking of lakes, and (4) a creel census to evaluate the results.

These lakes do not carry a predominating population of predatory fish but they are so heavily angled that introduced hatchery stock has had little opportunity of becoming established. Under the management plan the lakes will be stocked on an acreage basis. Bonaparte received No. 2 fingerlings, Limeburner No. 5 fingerlings, and Johnson and Kerr yearling trout in 1939. The allotments distributed in the three lakes last mentioned were marked by the removal of the adipose and one other fin. The primary object of the plan is to create better angling and to evaluate the stocking policy as carried on with these three sizes of trout. The lakes vary in their characteristics and no doubt also in their productive capacity but by means of the creel census and an investigation of conditions that obtain in the several lakes a yardstick may be established as to what is a good speckled trout lake. Johnson and Kerr Lakes together with all connecting streams have been closed to fishing until the opening of the trout fishing season in 1941 and Limeburner and Bonaparte Lakes, with their tributaries, have been closed until the opening of the season in 1942. A special guardian is or will be employed to enforce the closures and to obtain creel censuses when the lakes are re-opened.

The interest and co-operation of the general public and local organizations, which were referred to in previous reports, have been continued. Provincial fish and game protective associations co-operated and local fish and game clubs, angling and protective associations, assisted hatchery staffs, as opportunity offered, in the distribution of the season's output, particularly in waters in which these organizations are interested. Among those that were particularly helpful were the Madawaska County, the Fredericton, Grand Falls, Saint John, Yarmouth, Middleton, Coldbrook, Cobequid and Antigonish Fish and Game Protective Associations.

Prophylactic and sanitary measures were taken on quite an extensive scale to prevent the outbreak of disease at all hatcheries and rearing ponds. Valuable and much appreciated advice and co-operation were extended whole-heartedly by the directors and staffs of the Atlantic Biological Station and the Halifax Fisheries Experimental Station, all of which is referred to in the report of the Fisheries Research Board.

The Canadian National, the Canadian Pacific and the Dominion Atlantic Railway companies continued their generous assistance and co-operation by furnishing free transportation for shipments of game fish and game fish eggs with their attendants. The extent of this co-operation is indicated in the following summary:—

Railway	Total mileage on trip passes	Number of passages	Mileage baggage car permits			Number of cases or cans			Number of Permits
			Full	Empty	Total	Full	Empty	Total	
C.N.R.....	2,856	12	4,344	3,967	8,311	82	82	164	40
C.P.R.....	960	6	592	347	939	14	22	36	10
D.A.R.....	412	4	206	206	412	12	12	24	4
	4,228	22	5,142	4,520	9,662	108	116	224	54

NOTE.—Number of passages refers to transportation one way—a return trip counting as two passages. Number of permits refers to one way passages for cases or cans.

Experiments with equipment, methods and foods of various kinds were continued at several hatcheries. The experiments and investigations in relation to fish cultural problems that were made by the Fisheries Research Board of Canada are referred to in the report of the Board for 1939.

Inspections were continued with a view to locating waters where fish eggs might be obtained in sufficient quantities to warrant the establishing of collecting camps and also with a view to locating sites where the fish cultural service might be extended advantageously to districts that are not readily accessible from existing hatcheries. Expansion and major construction during the year consisted of an auxiliary hatchery and cold storage at Antigonish, thirty-two outside rearing troughs at Cobequid, eleven rearing ponds at Grand Lake, a superintendent's dwelling at Kejimikujik, a rearing pond at Margaree, sixteen circular and one longitudinal pond, the latter for brood stock, at Charlo, a double garage, workroom, food room, storage room and ice house at Saint John.

Collections, transfers and distributions are given to the nearest hundred in the summaries of operations at the respective establishments.

MARITIME PROVINCES

Senior District Supervisor of Fish Culture, James Catt

Fish cultural activities in this division made distinct progress, largely owing to necessary additions to the staff. The nucleus of a much needed progressive policy has been created which undoubtedly will ensure beneficial results. Specifically, there will be obtained a better knowledge of the lakes and streams of the provinces so that they may be restocked in the most effective and economical manner. This season saw the completion of a six-months' course by Supervisors F. A. Tingley and A. P. Hills at the Atlantic Biological Station, St. Andrews, N.B., where they received excellent instructions in chemistry, biology, pathology, anatomy, physiology, etc. Their subsequent field work reflects great credit on them and their instructors. As a whole, the superintendents and staffs of the various hatcheries and ponds carried out their duties in an efficient and zealous manner. Many of the establishments have reached a point where further expansion on present property is hardly feasible but hard work has kept them up to concert pitch. Expansion and improvement include the extension of New Mills salmon egg collection to the Jacquet and Benjamin Rivers; development of a large and growing speckled trout brood stock at Cobequid hatchery, with an increased distribution of yearlings; an improvement of brood stocks and much experimental work at Antigonish and Margaree; an increased output of sebago salmon at Grand Lake, including the initial distribution of speckled trout from that plant; the large number of Atlantic salmon fingerlings reared at Lindloff where in successive years an increasing number of these fish have been held per pond with practically no loss through the hottest weather of the year.

The number of lakes examined was not as great as had been expected, due to an unusually late spring and unavoidable delay in assembling field equipment.

The examinations, with a few exceptions, were made by Supervisors Tingley and Hills and the waters covered are listed in their reports. The material collected has yet to be analysed, further data collected in regard to pH and oxygen content during the winter, and additional soundings must be made.

Trout egg collections from brood stock held at the several hatcheries were very satisfactory. In all 17,303,980 ova were obtained from hatchery ponds, 742,420 from local lakes and streams and 2,573,130 were purchased. The average egg production per female for pond fish, including yearlings, was 694. From 254 females 460,460 rainbow trout ova were obtained. The average egg

production per female was 1,813. The growth of the rainbow in some instances was quite phenomenal. One specimen included in a group retained in a 30-foot rearing pond at Antigonish had grown from five pounds in the spring of 1938 to more than eight pounds in the spring of 1939.

The number of early-run Atlantic salmon secured for fish cultural purposes was considerably below the average of recent years. With few exceptions, early fish were scarce in nearly all the Maritime rivers. Unlike the sea trout, however, their entry into fresh water did not appear delayed by the very late spring.

In 1938 the earliest captures of salmon in Saint John Harbour were delivered to the East Saint John Pond on June 6, whilst this year the first deliveries were made on June 3. The general shortage of salmon for one season does not appear to have much significance. Poor runs on the Saint John River are reported to have been observed as long ago as 1899.

Operations in the Restigouche area were expanded to include the capture of parent salmon from the Benjamin and Jacquet Rivers. This proved a success although the fish, of a late run strain, averaged only 7.1 pounds as compared with 15.9 pounds of the early fish taken further up Bay Chaleur.

Four thousand eight hundred and seventy-five Atlantic salmon were impounded and 19,928,280 salmon eggs obtained. These eggs were laid down in the Maritime Province hatcheries, with the exception of small allotments that were made to Dalhousie University and Doctor A. G. Huntsman, University of Toronto. Atlantic salmon operations were as follows:—

Pond	First fish impounded	Last fish impounded	Total number fish impounded	Females stripped	Males stripped	No. eggs obtained	Average weight of fish
							lbs.
Margaree.....	Sept. 26	Oct. 23	645	498	141	5,459,000	11.6
Miramichi.....	Sept. 12	Oct. 1	1,801	909	612	6,226,568	8.7
Morell.....	Oct. 12	Nov. 27	500	160	116	1,089,828	8.6
New Mills, Chaleur Bay.....	May 25	July 15	463	238	162	1,890,737	15.9
New Mills, Jacquet and Benjamin Rivers.....	Sept. 14	Oct. 20	328	257	101	1,256,970	7.1
River Philip.....	Oct. 11	Dec. 4	605	381	224	2,512,800	12.3
Sackville River.....	Oct. 23	Oct. 29	100	46	40	180,300	4.0
Saint John.....	June 3	Aug. 16	433	172	83	1,312,080	10.5
			4,875	2,661	1,479	19,928,283	

NOTE.—Number of males stripped is approximate—some of them may have been used more than once.

Average yield per female fish—7,489 eggs.

In addition to the trout eggs obtainable from hatchery pond stocks, the efforts of the past year to collect eggs from wild stocks were continued and extended to Tweedie's Meadow brook, Kent County, Trout and Spear's brooks, Charlotte County, for speckled trout, and to Clinch brook, York County, for sebage salmon. Tweedie's Meadow brook was selected with the courteous permission of the Adogwasook Fishing Club as being a suitable stream where eggs of speckled trout of the sea-run strain, as well as data regarding the fish themselves, might be obtained. A fence and counting trap were built on the stream shortly above head of tide and another fence and trap were installed about half a mile farther up river. The fish entering the lower trap during the late spring and summer were counted and liberated. The upper trap was opened

in the fall when the fish were ready to spawn. Members of the club took fish by angling between the fences. The results were as follows:—

Fish counted at lower trap.....	1,187
Taken by anglers	265
Spawners taken from upper trap.....	250
Unaccounted for	672
Eggs obtained and laid down at Miramichi hatchery	255,380

From these results it is deduced that spawning grounds exist between the fences but owing to dark high water in the late fall they could not be located. Undoubtedly many of the fish counted through the lower trap were what are known locally as "bright" fish. These fish do not spawn during the year of ascent and may sometimes spend two or even three years in fresh water before doing so, as did those that were retained at the Margaree hatchery. It is also probable that a number passed the upper fence during the heavy October spates. These facts and conjectures should account for the relatively small number of fish captured at spawning time.

Following the serious diminution in gravid female trout at Three Brooks deadwater in the fall of 1938 certain remedial measures were suggested to Mr. Donald Fraser, the owner of the fishery. These included restrictions on the number of large females that might be taken by anglers during the summer. On the other hand reduction of the number of males which made up at least fifty per cent of the trout population was encouraged in order that they might be replaced by an increased number of females. Nine hundred and fifty thousand four hundred eggs were secured.

After a lapse of some fourteen years the collection of speckled trout eggs in the Lake Utopia area was renewed. Operations were not commenced as early as was wished and undoubtedly a number of fish had already passed up Trout brook, traversed Trout Lake and ascended Spear's brook before traps could be installed. Three hundred and seventy-two trout were taken and 353 stripped, the balance being immature fish or females that would not spawn for several weeks after the freeze-up. Eight thousand seven hundred eggs were collected at Spear's brook and 357,800 at Trout brook, all of which except a small shipment to the Atlantic Biological Station at St. Andrews were laid down at Saint John hatchery.

Whilst the number of fish taken was approximately only half that of the 1924 capture, the number of eggs obtained was fifty per cent greater. The females averaged 1,502 ova each. The eggs were of excellent colour and unusually large for the species. In 1924 they averaged 235 to the ounce; in 1939, 239 per ounce.

The examination of Clinch and Black brooks in the fall of 1938 indicated the possibility of a good collection of sebago salmon eggs. Two sets of fences and traps were consequently established in 1939 on the first named stream. Low water held up the spawning run for some time. This adverse condition was not improved when followed by an unusually high spate which completely submerged both fences and traps and the surrounding terrain for a considerable distance on each side of the river bank. This not only permitted the impounded fish to escape but gave a clear passage to fresh running fish. Recorded captures totalled 69 fish from which 26,000 eggs of excellent quality were obtained and laid down at Florenceville hatchery.

The results of collection of trout ova from Sand Lake, Annapolis County, Nova Scotia, whilst disappointing from a viewpoint of quality and quantity, yet provided valuable data as to the quantities of fingerlings that are required for waters of this type in order to restock them efficiently.

Sand Lake situated on the top of North Mountain in the Annapolis Valley is not accessible to wild fish. It contains few if any enemies or predators but prior to 1934 was inhabited by speckled trout introduced from the Middleton hatchery. Angling effort apparently resulted in the capture of all the fish and in

1934 it was restocked. The fingerlings used for this purpose grew rapidly and in 1936 a collection of 160,500 ova was obtained. From this time on it appears that the food in the lake, while sufficient to sustain the life of the mature trout, was insufficient to keep them in good condition with the result that in 1939 of 322 females captured only 142 were stripped, with the poor average of 636 eggs each. The superintendent of Middleton hatchery, who has been in charge of collection efforts, reports both sexes as being gaunt and thin and definitely smaller than the stock captured in the fall of 1937.

Thirty thousand and forty speckled trout eggs were collected at McRae's Lake, Richmond County, Nova Scotia, by the Lindloff hatchery staff. The fish in this water usually commence spawning in September—earlier than elsewhere in the Maritimes, so far as is known. Unfortunately in the last few years the angling effort has increased to such an extent as to cause a serious depletion of trout in this small lake with the resultant drop in its potentiality as a source of ova collections.

The following table covers the collections of speckled trout eggs from wild fish:

McRae's Lake	30,044
Tweedie's Meadow Brook	255,380
Lake Utopia Area	366,602
Three Brooks Deadwater	950,400
Sand Lake	90,400
P.E.I., all streams	290,122
	<hr/> 1,982,948

While no new establishments were built, the potentialities of what appear to be the most promising locations for hatcheries and rearing ponds in the Colchester-Hants, the West Annapolis-Digby and the South Queens districts, Nova Scotia, were investigated. Valuable information was obtained in regard to the flow and the temperature of several streams but further data are needed before selections could be made or development undertaken.

Feeding experiments included a variety of diets and are referred to in the reports of the hatcheries where the experiments were made.

The "V" type dams at Burpee brook and Lenihan brook built by the department and the Saint John Branch of the New Brunswick Fish and Game Protective Association, respectively, were kept under observation and the results of their installation noted. On Burpee brook heavy freshets had damaged the wings of the dam, which, however, had certainly created good pools. On Lenihan brook the boulders below the dam proved too heavy for water to move but this will be remedied by the Fish and Game Association.

Representative series of the fish produced at the Maritime Province hatcheries were shown at various exhibitions or contributed to displays made by provincial governments or by fish and game protective associations, although not to as large an extent as in some years. These exhibits are referred to in the reports of the hatcheries that produced the fish.

District Supervisor of Fish Culture F. A. Tingley

Studies in fresh water biology and kindred subjects bearing on fish culture were resumed at the Atlantic Biological Station, St. Andrews, New Brunswick, early in January and, with brief interruptions, were continued until the end of April. This course was most interesting and enlightening and the interest and patience of the instructors—Doctors Leim, M'Gonigle and Smith—are deeply appreciated. In addition to laboratory studies it included, under Doctor Smith, experience in superficial surveys over the ice and soundings of Navigation, St. Patrick and Kerr Lakes, Charlotte county, New Brunswick.

In addition to office work, preparation of reports, etc., activities included (1) accompanying Supervisor Catt on an inspection of the fish cultural establish-

ments in the Maritime Provinces not previously visited; (2) participation as departmental representative in the oral examination of candidates for the position of assistant at the Florenceville, Charlo and Kelly's Pond hatcheries; (3) survey work at Afton Lake and Crooked Creek, Prince Edward Island, Sunken and Wiles Lakes, Nova Scotia, brief examination of Skiff Lake, New Brunswick, construction of weir at Halfway River and collection of data in regard to their possibilities as hatchery sites of Falls brook, Halfway River and Barnes brook, Nova Scotia; (4) construction of fences and traps at Tweedie's Meadow brook and arranging for the collection of speckled trout eggs there and at Spear's and Trout brooks, New Brunswick, and (5) inspection of the hatcheries in Nova Scotia.

District Supervisor of Fish Culture A. P. Hills

The course of instruction in general biology, limnology, pathology, anatomy, etc., etc., at the Atlantic Biological Station, St. Andrews, New Brunswick, was resumed early in January and continued until the end of April. In addition to lectures and laboratory work the course included experience under the direction of Doctor M. W. Smith on the survey over the ice of Navigation, St. Patrick and Kerr Lakes, Charlotte County, New Brunswick. The course was most interesting and instructive and the patience and courtesy of the instructors, Doctors Leim, Smith and M'Gonigle, are deeply appreciated.

In addition to office work and the preparation of reports, activities included (1) accompanying Supervisor Catt on an inspection of all fish cultural plants in the division not previously visited; (2) inspection of possible trap-net sites in River Philip for taking adult Atlantic salmon for fish cultural purposes; (3) accompanying Doctor M'Gonigle on an inspection of Second River and McCormick Lake (source of the water supply for the Cobequid hatchery); (4) survey or partial survey of Robinson Lake, New Brunswick, Giant's, MacInnes, Sullivan, Kennedy, McIsaac's, McMillan, Enon, Lever's, Lindloff, Pringle or McRae and Mary Ann Lakes, Nova Scotia; (5) construction of fences and traps for the collection of sebago salmon eggs at Clinch brook, New Brunswick; and (6) inspection of hatcheries in New Brunswick and Prince Edward Island and the Middleton and Yarmouth establishments.

ANTIGONISH HATCHERY

K. G. Shillington, Superintendent

Production and receipt of eggs during 1939 were: from hatchery ponds, speckled trout 8,383,000 and rainbow trout 296,800; from the Margaree hatchery 1,000,000 and Kelly's Pond hatchery 500,000 Atlantic salmon eyed eggs. Speckled trout eyed eggs transferred to other hatcheries were: 915,000 to Bedford, 400,000 to Middleton, 950,000 to Yarmouth, 500,000 to Lindloff, 760,000 to Kelly's Pond and 1,300,000 to Cobequid. Distributions were: Atlantic salmon 1,396,200, rainbow trout 57,200 and speckled trout 1,661,000. Four thousand five hundred Atlantic salmon fingerlings and 10,800 speckled trout fingerlings, yearlings and older fish were marked by the removal of fins before they were distributed in the various waters of the district. Selective breeding continued to show improved results.

An auxiliary hatchery 72 feet 3 $\frac{3}{8}$ inches by 28 feet 6 inches was constructed by contract during the year. It includes a hatching room, coal room and storage room with large storage space overhead and is equipped with 21 troughs 20 feet long, 21 $\frac{1}{2}$ inches wide and 10 inches deep with movable partitions $\frac{7}{8}$ inch thick for dividing each trough during the incubation period. The troughs are set up in 7 batteries of 3 troughs each with foot troughs. An 8-inch pipe for supplying the hatchery with water was connected to the main intake pipe laid

the previous year. Due to the large quantities of perishable fish food that will be stored at the plant for feeding brood stock and fingerlings a cold storage building, 10-ton capacity, 20 feet by 25 feet complete, with engine room and feed room was constructed. A concrete retaining wall, 120 feet in length, was built along the river bank at the rear of the hatchery. The wall was reinforced by placing a steel rail the full length in its centre and by three wings extending twelve feet into the river banks. The space behind the wall was filled in with rocks and eight drains were placed through the wall to carry off any water that might tend to accumulate behind it. Minor repairs were made to the hatchery dam.

The storage dam at the outlet of Loch Katrine was used to good advantage during the dry summer as little rain fell from the first of June until November.

Feeding tests with three-year and one-year-old parent speckled trout were carried out during the year. The fish were retained under similar conditions in ponds. The three-year stock were fed on (1) 100 per cent fish, (2) 100 per cent plucks, (3) fish and one feed of plucks per week, (4) fish and one feed plucks in two weeks. The lowest loss from July 1 to spawning was in that group fed diet No. 3 and the highest loss on diet No. 2. The best yield per female was on diet No. 1 and the lowest on diet No. 2. The one-year stock were fed on (1) fish and one feed of plucks per week, (2) 50 per cent fish and 50 per cent plucks. The lowest loss was on diet No. 1 and the best yield per female on diet No. 2. Eggs from the various groups are being kept separately to determine results to hatch. The fry from the six groups of speckled trout mentioned in the last annual report were kept separately up to June 15 and showed least loss in that group from parent stock which had been fed 50 per cent plucks plus 50 per cent fish. Other experiments were made during 1939 or are under way in connection with carrying capacity for troughs, speckled trout deprived of food some time before spawning and those fed regularly, eggs from speckled trout two-year females fertilized with milt from one- and two-year males and trout eggs fertilized with different amounts of milt.

BEDFORD HATCHERY AND SACKVILLE RIVER SALMON-RETAINING POND

George Heatley, Superintendent

In February 915,000 speckled trout eggs were received from Antigonish and in March 900,000 Atlantic salmon ova were sent to Yarmouth. Dalhousie University was supplied with 3,000 Atlantic salmon eggs and Grand Lake ponds 612,000 advanced fry and fingerlings of the same species. Distributions amounted to 1,249,000, comprised of 622,700 Atlantic salmon and 626,300 speckled trout. In the fall 602,700 Atlantic salmon eggs were received from River Philip salmon pond and 172,300 from Sackville pond.

The main highway passing the hatchery was diverted during the year and as a result a considerable portion of the lower end of the canal which supplies the hatchery with water had to be re-built.

Extensive repairs were also made to the earthen pond on the east side of the hatchery and the appearance of the grounds improved by grading, sodding and the construction of a rock garden. An experimental closed circulatory system is being tried out with a view to promoting early hatch and better growth before distribution.

The usual barricades and traps were installed in the Sackville River well in advance of the date on which, under normal conditions, the run of salmon occurs. Owing to the low water the migrating salmon did not enter the river until late in the season and it appears not unlikely that some that would have ascended normally resorted to other streams to spawn.

Only 100 fish were impounded between October 23 and 29, the run apparently being over on the last-mentioned date. The collection was 180,300 eggs which were all laid down in the Bedford hatchery except for 8,000 sent Dalhousie University.

COBEQUID HATCHERY AND RIVER PHILIP SALMON-RETAINING POND

J. W. Heatley, Superintendent

Some 1,531,900 speckled trout eggs were obtained from the hatchery ponds and 1,410,100 Atlantic salmon eggs received from the River Philip pond. In March, 1,300,000 speckled trout eyed eggs were secured from the Antigonish hatchery and 1,200,000 Atlantic salmon eyed eggs transferred to Middleton (Nietaux Falls) hatchery. In November, the Grand Lake rearing ponds were supplied with 20,000 speckled trout No. 4 fingerlings. Distributions from Cobequid were: 1,465,000 Atlantic salmon and 892,500 speckled trout. A total of 49,214 trout of various ages were marked before being distributed by the removal of fins. A start was made in selective breeding.

Atlantic salmon fingerlings in three troughs were fed experimentally on the following diets: (1) beef heart, (2) 50 per cent heart and 50 per cent liver, (3) liver. The least loss and greatest increase in weight were attained on diet No. 3. Other experiments included growth determination for wild trout in captivity, trough capacity tests for salmon fry and fingerlings and the addition of Lugol's solution to liver for speckled trout fingerlings.

During the year the clay surface was removed from nine of the circular ponds, eight being re-lined with asphalt and one with gravel; thirty-two outside rearing troughs were set up, and some improvements made to the grounds.

River Philip pond was in charge of Assistant Clarence Sayer. As considerable damage had been caused by ice during the previous winter, quite extensive repairs were necessary, including the building of two substantial piers and a section of the canal wall.

Low water was experienced and the run of salmon was not as large as that of recent years. Six hundred and five fish were impounded from October 11 to December 4 inclusive. Two million five hundred and twelve thousand eight hundred eggs were secured, which were laid down as follows: Cobequid hatchery 1,410,100, Bedford hatchery 602,700 and Middleton hatchery 500,000. Some 171 males and 319 females were tagged, salt bathed and returned to River Philip.

COLDBROOK REARING PONDS

E. Barrett, Superintendent

Speckled trout for Coldbrook ponds were transferred about a month earlier than they were last year, 354,500 being delivered in the advanced fry stage from the Middleton hatchery prior to May 13. Further lots amounting to 20,900 rainbow trout fingerlings were received from the same hatchery on August 20 and September 4. The speckled trout carried well until the second week in June when considerable loss was experienced for a period of approximately three weeks. They then made satisfactory growth and by October 6 averaged $4\frac{1}{2}$ inches in length, with individual specimens ranging from $5\frac{5}{8}$ to $6\frac{5}{8}$ inches. The rainbow trout carried well throughout the season. The distribution was successfully made with the help of the Middleton hatchery staff, together with considerable assistance from the King's County Fish and Game Protective Association and the fishery inspector for the district. The total output was 110,000, composed of 20,900 rainbow and 89,100 speckled trout.

Minor repairs were made to the dam and ponds following the washout in the spring and considerable work was done to improve the appearance of the property.

GRAND LAKE REARING PONDS

J. M. Butler, Superintendent

Efforts to develop a brood stock were continued but the number of eggs taken from pond fish, while slightly more than in 1937, was much less than in

1936 and 1938. Some 9,000 ouananiche and sebago eggs of poor quality were secured. Only a little over 57 per cent of the older fish were stripped. Traps were again operated for wild stock at Waverley run and Rawdon River resulting in a collection of 50,000 sebago salmon ova. Eighty-two fish were taken at both places from October 28 to November 11, averaging in weight $2\frac{1}{2}$ pounds.

In June 612,000 Atlantic salmon advanced fry and fingerlings were received from the Bedford hatchery and in November 20,000 speckled trout fingerlings were transferred from the Cobequid hatchery. The latter group will be carried at Grand Lake through the winter for planting next spring. Distributions for the season were: 417,000 Atlantic salmon (including 10,000 No. 2 fingerlings supplied Doctor A. G. Huntsman in connection with his Atlantic salmon investigations on the Moser River), 10,290 sebago salmon and 10,000 speckled trout yearlings. Over 10,300 sebago salmon of various ages were marked by the removal of fins before they were distributed.

Ten earthen ponds, 96 feet long by 4 feet wide and $1\frac{1}{2}$ to 2 feet deep, and one large pond 96 feet long by 10 feet wide and $3\frac{1}{2}$ to 4 feet deep, were added to the rearing facilities of the plant. The dam was repaired and considerable improvements made to the grounds.

KEJIMKUIK REARING PONDS

F. F. Annis, Superintendent

The work of fitting up the ponds was begun on April 24 but the season's operations really commenced with the delivery of 100,000 speckled trout fry from the Yarmouth hatchery on May 5. The allotment of Atlantic salmon from the same hatchery was received when these fish had reached a suitable stage for shipment, a total of 300,000 being delivered from May 29 to June 23. Both salmon and trout made excellent growth and were heavier at their first weighing than they were last year. In view of the heavy losses that occurred in speckled trout that were being carried through the season in previous years the distribution of this species was begun earlier in the season until when the real hot weather commenced the allotment was reduced to approximately 25,000. Unfortunately, however, with the arrival of the hot weather heavy losses in trout occurred. Those that survived this period and were retained until the end of the season did extremely well and were close to six inches in length when they were distributed on October 23.

In comparison with the trout the salmon carried through the season with really no loss and practically the full allotment of 300,000 was distributed in the Medway River. At that time they ranged in length from two and one-half to four and one-half inches.

Periodical salt baths were given all fish throughout the season with a view to keeping disease under control. The general condition of the water has improved to a considerable extent over last year. Oxygen saturation throughout the season generally was much better than it had been in any previous season since the ponds were opened. The weather was unusually dry but ample water for the ponds was available at all times.

Considerable trouble has been experienced with algal growths but it was found that this trouble could be avoided by lowering the water in the ponds daily to about one-half its normal depth and keeping it at this level exposed to the sun's rays so long as the safety and welfare of the fish permitted. During the time that this practice was followed it was necessary to remove the algae only once weekly while previously daily cleanings were necessary.

Owing to an unusually dry season water levels generally were so low as to make most of the spawning grounds in the smaller streams of the district inaccessible to trout up to the end of October when the ponds were closed for the season.

A bungalow 28 feet 3 inches long by 21 feet wide with 9-foot posts, containing four rooms as well as a pantry and a small cellar for vegetables, was built. The grounds were levelled, a well for household use was sunk and a power food grinder installed. The plant is now well equipped for seasonal operations such as have been carried on heretofore.

For approximately 30 days Grafton brook between the water supply dam and the lake, a distance of about 200 yards, yielded from 8 to 10 trout daily. There was also excellent angling immediately above the dam in the outlet of Grafton Lake but it was not feasible to keep anything like a correct census of the fish that were taken. Total distributions were 77,000 speckled trout and 300,000 Atlantic salmon fingerlings.

LINDLOFF HATCHERY

Wm. T. Owens, Superintendent

Low water conditions prevailed at McRae Lake and the collection of speckled trout eggs made therefrom was not as large as last year although 30,000 were secured. The speckled trout caught in the brook near the hatchery and placed in the ponds in 1938 with a view to establishing a strain of brood stock which would be resistant to high temperatures, remained healthy, thrived during the high temperatures of the past summer and attained a good growth yielding 17,700 ova. Eyed eggs received were: 500,000 speckled trout from the Antigonish and 600,000 from the Margaree hatchery and 91,000 rainbow trout from the Crystal Lakes fish hatcheries (purchased). In the autumn 1,000,000 Atlantic salmon ova were obtained from Margaree salmon-retaining pond. Distributions for the season were: 893,120 Atlantic salmon, 83,900 rainbow trout and 917,600 speckled trout. Nearly 6,000 of the speckled trout fingerlings were marked by the removal of fins before they were distributed.

Experiments in feeding Atlantic salmon fingerlings were carried out in circular ponds using the following diets (1) 5 per cent fish meal plus 95 per cent liver, (2) 5 per cent fish eggs plus 95 per cent liver, (3) 100 per cent liver. The greatest per cent increase in weight was attained on diet No. 1. Speckled trout fingerlings were fed on seven different diets but results were not considered conclusive, due to disease breaking out.

During the year necessary painting was done in the hatchery and dwelling and much improvement was made to hatchery equipment and grounds, including the installation of a power plant and water system and the construction of 15 canvas pond shades and 14 shipping cases.

Fishing conditions in the Lindloff area are noticeably improving and there has been a marked increase in the number of anglers who are fishing the waters in this district. Mary Ann's Lake, which was first stocked from this hatchery in 1938 and considered fished out at that time, was in 1939 found to contain a fairly plentiful supply of trout averaging seven inches in length. Fishery inspectors for the district have assisted with distributions when required.

MARGAREE HATCHERY

W. D. Turnbull, Superintendent

The hatchery ponds produced 3,137,200 speckled trout eggs this season, and the Margaree salmon-retaining pond supplied this hatchery with 4,459,000 Atlantic salmon ova. Eyed eggs transferred were: 600,000 speckled trout to the Lindloff hatchery and 1,000,000 Atlantic salmon to the Antigonish hatchery. Distributions were: 2,915,100 Atlantic salmon and 1,770,400 speckled trout. Of the above, 35,300 Atlantic salmon fingerlings and 18,400 speckled trout fingerlings, yearlings and older fish were marked by the removal of fins. Speckled trout fingerlings were fed on the following diets from June 2 to

July 26: (1) 100 per cent beef liver, (2) 75 per cent liver plus 25 per cent Fshflake. Diet No. 1 produced less loss and greater increase in length and weight than diet No. 2. An experiment to determine the effect of non-feeding parent three-year old speckled trout from September 15 to spawning time was carried out in 1938; a similar group was fed as usual. Non-feeders yielded 871 eggs per female while those fed as usual yielded 937. The loss of eggs to hatch in 1939 in the first group was 12.1 per cent and in the second 16.4 per cent. The experiment is being repeated in 1939-40 but for a different period of non-feeding.

Forty thirteen-foot hatching troughs were built to replace old equipment beyond repair, hatchery was wired for electric lights, and the north and south sides of hatchery property were enclosed with a fence. Rearing facilities were increased by an additional pond with plank sides and the screens of circular ponds were improved.

MARGAREE SALMON-RETAINING POND

J. P. Chiasson, Superintendent

In accordance with the usual practice, salmon for the Margaree salmon-retaining pond were purchased from the Margaree Harbour Salmon Fisheries Association.

The association's net was set on September 18 and operated continuously until October 23. In five days' operation, September 19 to 23, fifteen salmon were caught and liberated, twelve of which were tagged and three liberated without tagging as they were too small. No salmon were caught on September 24 and 25. During the next 14 days, September 26 to October 9, half the salmon caught each day were tagged and liberated above the net on the day that they were captured, and the remainder were placed in the pond. From October 10 until heavy freshets put the trap out of fishing condition on October 23 all salmon caught were placed in the retaining pond. The number of salmon tagged and liberated above the net, September 19 to October 9, inclusive, was 216. During the whole of the season 645 salmon were impounded, 216 tagged and liberated, and 3 small salmon liberated without tagging. Eight hundred and sixty-four salmon (twenty taken a second time) passed through the association's net from September 18 to October 23 this year.

Altogether 38, or 17.6 per cent, of the 216 tagged salmon were recaptured. Only 11 or 5.1 per cent were taken by anglers and 27 were retaken in the association's net, 20 being transferred to the pond, stripped and liberated and 7 liberated direct from the net. Three caught by anglers were reported taken in McDaniel pool, two in Forks pool and one each in Black Rock pool, McKenzie pool, Hart pool, Hatchery pool, Rock pool and Cranton bridge pool. The following is a record of lapse of time and distance travelled by the tagged salmon reported caught in the several pools.

Tag No.	Tagged and liberated	Caught	Where caught	No. days lapsed	Distance travelled
K1716	Sept. 19	Oct. 1	McDaniel pool.....	12	6 miles
K1735	Sept. 27	Oct. 4	McDaniel pool.....	7	6 "
K1738	Sept. 27	Oct. 8	Black Rock pool.....	11	17 "
K1755	Sept. 28	Oct. 14	McKenzie pool.....	16	20 "
K1766	Sept. 29	Oct. 5	Forks pool.....	6	7 "
K1782	Sept. 29	Oct. 8	Forks pool.....	9	7 "
K1790	Sept. 30	Oct. 4	Hart pool.....	4	12 "
K1800 or K1900	Sept. 30 or Oct. 9	Oct. 13	McDaniel pool.....	13 or 4	6 "
K1832	Oct. 8	Oct. 13	Hatchery pool.....	5	14½ "
K1892	Oct. 9	Oct. 12	Cranton bridge pool.....	3	11 "
K1919	Oct. 9	Oct. 14	Rock pool.....	5	14 "

In 1938, three (1.5 per cent) of the 200 salmon tagged and liberated above the association's net, October 3 and 4, were found in the retaining pond during stripping operations, but in 1939, 27 (12.5 per cent) of the 216 salmon tagged and liberated at the same place were re-taken in the net. The superintendent is of the opinion the difference in the percentage recaptures is due to the stage of the tides when the tagged salmon were liberated. In 1938, the water was high and dark on account of heavy rains, but in 1939, the water was clear during most of the time that the net was fished. Six hundred and forty-five salmon, averaging 11.6 pounds in weight, were impounded. During the retention period of two and a half months the small loss of only three fish occurred. Five million four hundred and fifty-nine thousand eggs were obtained which were transferred, 4,459,000 to Margaree and 1,000,000 to the Lindloff hatchery.

MERSEY RIVER REARING PONDS

T. K. Lydon, Officer-in-Charge

The lower pool only in the fishway at No. 3 development, Mersey River (the fishway has not been in use for several seasons), was utilized in an experimental way for the rearing of Atlantic salmon fingerlings in 1938. As the results of this experiment were so promising, the second or upper pool, as well as the upper section of the fishway, was fitted up for rearing salmon, making three separate enclosures for use this season. Some delay was experienced in getting proper screening for the upper pool and the upper section of the fishway, but 147,000 Atlantic salmon advanced fry were transferred to the lower pool from the Nictaux rearing station early in June. Further transfers were made from the same source until a total of 322,000 salmon were placed in the Mersey ponds from June 5 to June 27. Early in July a heavy loss was caused by an outbreak of acute bacterial gill disease. During this outbreak, and hoping that the action taken might prove beneficial, the water supply to the three enclosures was increased to about double the previous volume. This increased flow cut a channel in the bank of the river at the outlets of ponds 1 and 2, which permitted eels to ascend into pond No. 1 through the walls of the fishway. From pond No. 1 they were able to work their way down into pond No. 2. In order to get rid of the eels it was necessary to drain ponds 1 and 2 and transfer the fish in them to pond 3. No further difficulty should be experienced with eels, as sluices have been built at the outlets of ponds 1 and 2 and also at the outlet of pond No. 3, which carry the water therefrom over the bank in an abrupt drop to the river below.

The fingerlings this year were distributed by boat at suitable points all over the river below the ponds, as the creeks tributary to the river, in which the fingerlings were distributed last season, were almost dry due to an unusually warm summer. The distribution amounted to 106,100 Atlantic salmon.

The facilities for controlling the flow of water to the individual enclosures and for preventing eels from ascending into the ponds have been so improved that no future difficulty is expected from these sources.

To determine which was the cheaper food the superintendent weighed beef hearts before and after grinding and compared results with liver. Out of 97 pounds of heart after removing fat and waste 76 pounds of ground heart were left, or over 78 per cent of the gross weight. On the basis of 100 pounds of prepared food, the hearts were slightly over \$2.00 cheaper than the liver.

MIDDLETON HATCHERY, STEVENS PONDS AND NICTAUX REARING STATION

F. M. Millett, Superintendent

Although 507 speckled trout were caught at Sand Lake, and fish were reported to be in somewhat better condition than the previous year, the collection

of eggs was disappointing—only 90,400 of poor quality being obtained. In addition, the Middleton hatchery received the following supplies of eggs: In February, 400,000 speckled trout from the Antigonish hatchery; in May, 98,000 rainbow trout from the Saint John hatchery and in the autumn, 500,000 Atlantic salmon from River Philip pond and 280,000 speckled trout (purchased) from the American Fish Culture Company.

Fry and fingerlings to the extent of 354,500 speckled and 20,900 rainbow trout were transferred to the Coldbrook rearing ponds.

Distributions from the Middleton hatchery were: 442,500 Atlantic salmon, 38,000 rainbow trout and 1,050,600 speckled trout. Ten thousand Atlantic salmon and 12,100 speckled trout fingerlings were marked by the removal of fins before being distributed.

The brook leading to the hatchery pond was cleaned out, which gave an increased flow of thirty gallons of water per minute. An artesian well drilled during the year gives an additional forty gallons per minute. The hatchery supply pond was drained and limed on September 20 to destroy excessive growth of vegetation which threatened to choke up this reservoir. The wood barriers at the head of Stevens ponds were replaced by concrete.

The Nictaux rearing station was opened on March 21 and shortly after that date 1,200,000 Atlantic salmon eyed eggs were received from the Cobequid and 500,000 from the Miramichi hatchery. Crowding necessitated transfers of 500,000 to Middleton hatchery and 200,000 to Stevens ponds. Between June 5 and 27, 322,000 were transferred to the Mersey ponds. Three hundred and thirty-three thousand Atlantic salmon were distributed from this station.

As the intake pipe which led from the lower end of the power canal to the hatchery was liable to freeze during the winter, it was re-laid to the main power dam. The Nova Scotia Light and Power Company, Limited, which operates the power station, co-operates closely with the department at all times and lowered the water in the canal while the intake pipe was being connected and has screened the head of the canal to prevent smolt from descending through their turbines.

YARMOUTH HATCHERY

H. V. Gates, Superintendent

Owing to protracted hot weather and extremely high temperatures that prevailed at Yarmouth during the greater part of the summer (water temperatures to 83°) severe losses were suffered in the speckled trout brood stock. Those that survived were in such poor condition that the small number of eggs obtained from them were a total loss by January 6. Other collections from pond stock consisted of 50,000 rainbow and 10,000 Kamloops trout. Eyed eggs received during the year were: 900,000 Atlantic salmon from the Bedford hatchery, 950,000 speckled trout from the Antigonish hatchery and a total of 1,223,500 speckled trout which were purchased—49,000 from the American Fish Culture and 1,174,500 from the Brookdale Trout Company. One hundred thousand speckled trout fry and 300,000 Atlantic salmon advanced fry and fingerlings were transferred to the Kejimikujik rearing ponds. Distributions from Yarmouth were: 356,000 Atlantic salmon, 8,370 Kamloops, 23,800 rainbow and 696,700 speckled trout. Two thousand five hundred speckled trout yearlings were marked by the removal of fins before being distributed.

Repairs during the year consisted of the placing of concrete bottoms three inches thick in six of the long ponds, the painting of the hatchery room, office and feed-room and minor repairs to buildings as necessary. The 32-volt hatchery power plant was discontinued as electric power was made available by the Western Nova Scotia Electric Company, Limited, extending its power line (110 volts) to the hatchery.

One group of parent two-year speckled trout was not fed from September 1 to spawning time in 1938 and a similar group was fed as usual. The average yield of eggs per female and the percentage hatch in eggs were higher in the group that was fed in the regular way.

CHARLO HATCHERY

R. O. Barrett, Superintendent

During the summer sixteen circular rearing ponds, 25-foot diameter, and one large brood pond, 160 feet by 20 feet and 5 to 7 feet deep, were added to this plant, the property fenced, driveway and walks gravelled and the grounds further improved.

Five hundred thousand Atlantic salmon eyed eggs were received from the Miramichi hatchery, 151,200 speckled trout eggs from the Florenceville hatchery, 1,890,700 Atlantic salmon ova from the New Mills pond and 1,257,000 from Benjamin and Jacquet Rivers. Two hundred and twenty thousand Atlantic salmon (New Mills stock) eggs were transferred to the Grand Falls and 30,000 to the Florenceville hatchery. One million seven hundred and ninety-six thousand seven hundred Atlantic salmon and 59,600 speckled trout fingerlings were distributed.

In experimental feeding of speckled trout fingerlings the following diets were used: (1) beef heart plus Lugol's solution, $\frac{1}{2}$ ounce to 50 pounds, (2) beef heart, (3) liver. The greatest increase in weight occurred with diet No. 2, and smallest loss with diet No. 3.

FLORENCEVILLE HATCHERY

George Sutherland, Superintendent

Two million four hundred and fifty-five thousand one hundred speckled trout eggs were obtained from the hatchery pond fish and 26,000 sebago salmon eggs from Clinch brook, York county; 30,000 Atlantic salmon (New Mills stock) eyed eggs were also received from the Charlo and 1,000,000 from the Miramichi hatchery. From the speckled trout laid down the previous fall 151,200 were transferred to Charlo in the eyed stage, 491,400 to Grand Falls and 150,000 to the Miramichi hatchery. Two million one hundred and sixteen thousand two hundred Atlantic salmon and 729,500 speckled trout were distributed. The Fredericton branch of the New Brunswick Fish and Game Association rendered valuable assistance in the distribution of fish in their district. Twenty-nine thousand one hundred Atlantic salmon fingerlings and 16,500 speckled trout fingerlings, yearlings and older fish were marked by the removal of fins.

A group of three-year old parent speckled trout was not fed from September 12, 1938, to spawning time. They yielded 768 eggs per female. A similar group fed as usual yielded 962 eggs per female. Losses in these eggs to hatch in 1939 were greater in the fed group than in the unfed group.

Atlantic salmon yearlings, speckled trout yearlings and older fish were supplied the fish display which was made at the Edmundston fair, September 19 to 21. Speckled trout were also supplied the Canadian National Railways for display in connection with salmon and trout angling contiguous to the Transcontinental railway.

GRAND FALLS HATCHERY

W. A. McCluskey, Superintendent

The collection of speckled trout eggs from Fraser's pond, Three brooks, this season was 950,400, some 291,500 larger than the number taken in 1938. Eyed eggs received from other hatcheries were: Atlantic salmon from Miramichi

1,000,000, from Charlo 220,000 (New Mills stock) and speckled trout from Florenceville 491,400. In the autumn 954,200 Atlantic salmon ova were received from the Saint John pond. Two million four hundred and fifty-seven thousand seven hundred Atlantic salmon and 1,251,500 speckled trout fry and fingerlings were distributed. Splendid assistance was given by the Madawaska county and the Grand Falls branches of the Fish and Game Protective Association in the planting of fry and fingerlings. Fifty-one thousand three hundred Atlantic salmon (New Mills stock) were marked by the removal of two fins. Necessary repairs were made to dwelling and hatchery and the buildings were redecorated. Four aquaria were supplied.

Atlantic salmon and speckled trout fingerlings reared at this hatchery were included in the fish display that was made at the County fair at Edmundston, September 19 to 21.

In experimental feeding of speckled trout fingerlings three diets were used, (1) liver, (2) 90 per cent liver plus 10 per cent fish meal, (3) 10 per cent liver plus 90 per cent fish meal. Diet No. 1 gave the least loss and largest increase in weight from July 17 to August 19.

MIRAMICHI SALMON-RETAINING POND AND HATCHERY

Frank Burgess, Superintendent

In accordance with the usual practice, adult salmon for the retaining pond were secured by public tender and contract. The fish were taken in trap or pound-nets which were fished continuously from September 10 to October 7. During this period 1,801 salmon were impounded averaging 8·7 pounds in weight. A loss of only 2·6 per cent occurred from the time that these fish were caught until stripping operations, which were carried on from October 20 to November 11, were completed. Six million two hundred and twenty-six thousand six hundred eggs were secured and laid down in the Miramichi hatchery. The spawning shed at the pond was raised, cribbed and floored.

Two hundred and fifty-five thousand four hundred speckled trout eggs were collected at Tweedie's Meadow brook. Atlantic salmon eggs collected in 1938 were transferred from Miramichi hatchery when eyed as follows: to Charlo 500,000, Florenceville 1,000,000, Grand Falls 1,000,000, Middleton-Nictaux 500,000 and St. John 500,000. One hundred and fifty thousand speckled trout eggs were received from Florenceville. Distributions for the season were: 3,587,100 Atlantic salmon and 101,700 speckled trout, which included 11,300 trout marked by removal of two fins.

A verandah, 8 by 20 feet, was added to the residence. Ice-house and storage building were painted and the grounds further improved.

NEW MILLS SALMON-RETAINING POND

William White, Superintendent

Four hundred and sixty-three salmon of the early run, purchased from the commercial fishermen of the district, were delivered between May 25 and July 15 and yielded 1,890,700 eggs. The last fish was stripped on November 13 but notwithstanding the long period of retention from May 25 the loss in these early salmon was only 1·7 per cent. A further collection of late-run salmon was made from trap-nets operated in the Jacquet and Benjamin Rivers. The number taken at these two places from September 14 to October 20 was 328 (262 from Jacquet and 66 from Benjamin). They were placed in pontoons and towed to the New Mills pond where they yielded 1,257,000 ova. The loss in the late run fish was 3·7 per cent. Two hundred and three of the late salmon (Jacquet and Benjamin Rivers) were tagged before liberation. The early

fish averaged almost 16 pounds, and the late run slightly over 7 pounds in weight. All eggs were laid down in the Charlo hatchery. Six sections of the pond fence were re-built.

SAINT JOHN HATCHERY, SAINT JOHN SALMON-RETAINING POND AND CHAMCOOK LAKES EGG-COLLECTING STATION

J. D. Nichol, Superintendent

The collection and receipt of eggs at Saint John hatchery were: from hatchery ponds 1,774,000 speckled trout and 113,700 rainbow trout, Miramichi hatchery 500,000 Atlantic salmon, Saint John pond 341,900 Atlantic salmon, Chamcook Lakes 96,200 sebago salmon, Trout brook 357,400 and Spears brook 8,700 speckled trout eggs. Ninety-eight thousand rainbow trout eggs were transferred to the Middleton hatchery and 1,000 Atlantic salmon eggs were sent Doctor A. G. Huntsman at the University of Toronto. Distributions were: 1,403,200 Atlantic salmon and 835,700 speckled trout. The Fish and Game Associations of the district and the fishery officer at Pocologan rendered valuable assistance in distributing the season's output. Adult Atlantic salmon and three and four year old speckled trout were given the Bureau of Information and Tourist Travel for the display made by the Province of New Brunswick at the Sportsmen's Shows at Boston and New York. Representative series of fish were also supplied the Moncton and Sussex branches of the New Brunswick Fish and Game Protective Association for displays made by them at the Moncton and Sussex exhibitions. Two thousand and sixty speckled trout yearlings were marked by the removal of fins.

A double garage, workshop, feedroom, storage room and ice-house, under the same roof, were built.

In 1938 the two-year-old speckled trout brood stock were fed as follows: Diet 1—90 per cent liver plus 10 per cent fish; diet 2—100 per cent liver. Diet 2 was considerably better than diet 1 in regard to the average egg yield and slightly better in regard to the percentage hatch of the eggs.

The Saint John Salmon-Retaining Pond was fitted up in May and ready for operation before the first fish arrived early in June. The number of salmon obtained for the pond was the smallest since 1920. From June 3 to August 16 inclusive only 433 salmon, averaging $10\frac{1}{2}$ pounds each, were impounded. One million three hundred and twelve thousand eggs were secured in October and November and were allotted to: Grand Falls 954,200, Saint John 341,900, and Doctor Huntsman, Toronto, 15,900.

Salmon bearing tag No. K537 was reported caught on October 31, 1939, at Crow head, Twillingate, Newfoundland. This salmon was tagged and liberated at the Saint John retaining pond on November 11, 1938. It is the first Saint John River salmon reported from Newfoundland waters since the tagging of salmon commenced in 1913.

The collection of sebago salmon eggs at Chamcook Lakes was under the direction of Assistant T. K. Lydon, of the Saint John hatchery. As the season was unusually dry, there was no flow of water until November 2 in the brook between the upper and lower lakes where the trap is set. Under normal conditions the majority of the salmon are caught before this date and it is likely that some salmon spawned along the lake shore when they found that they could not enter the creek. From November 2 to December 2, 67 females and 45 males, or a total of 112, were caught. After November 19 only 6 fish were taken and none were caught after December 2, although the trap was kept in fishing order until December 11 to ascertain if there is a late run of fish. Twenty-two of the 112 fish that were handled, or 19.6 per cent, had the adipose and right pectoral fins missing, having been marked in this way before they were distributed from Saint John hatchery. Ninety-nine thousand two hundred eggs were secured

between November 8 and December 12 and laid down in the Saint John hatchery, with the exception of a small number that were sent to the Atlantic Biological Station, St. Andrews, New Brunswick.

A female sebago salmon that was tagged in November, 1937, caught again and stripped in 1938, was caught for the third successive year at the Chamecook Lakes and stripped for the second successive year this season. This is the first time in this department's experience that a definitely identifiable wild fish has been taken during three successive years, but it may be a more common occurrence than is generally believed as a very small proportion of the salmon handled for fish cultural purposes are tagged or can be individually identified.

CARDIGAN REARING PONDS

A. Tait, Superintendent

Preparatory work in connection with the ponds was commenced on May 15 and by the 27th of that month 584,000 speckled trout advanced fry and on July 1, 93,200 rainbow trout advanced fry were transferred from the Kelly's Pond hatchery. Owing to cool weather during the month of June the fingerlings made slow growth but when the distribution was completed towards the end of October the speckled trout ranged in length up to 5½ inches and the rainbow trout to 4 inches.

Ten thousand No. 4 speckled trout fingerlings were marked by the removal of the adipose and left pectoral fins. Considerable numbers of these fingerlings were later observed in Watt's stream when speckled trout eggs were being collected there in December. No serious epidemics occurred and parasites were kept under control with frequent salt baths. Algae, growing on the sides and bottoms of ponds, were destroyed by lowering the water and sprinkling coarse salt over the exposed parts. The algae died in a couple of days and could then be worked to the centre of the pond and cleaned out. Periodical distributions of No. 2 fingerlings were necessary from July 24 to August 2 to prevent crowding, although general distributions were not completed until October 27. The output for the season was 88,300 rainbow and 537,000 speckled trout.

The grounds and the general appearance of the property were improved by sodding and the planting of shrubs. The trees on the flooded area above the dam have been removed and will be used for fuel.

KELLY'S POND HATCHERY AND MORELL RIVER SALMON-RETAINING POND

F. C. Hayley, Superintendent

Local collections of eggs this season amounted to 290,100 speckled trout from Andrews and York ponds and 1,089,800 Atlantic salmon from Morell pond. The eggs were eyed at the Kelly's Pond hatchery and since Andrews and York ponds are privately owned, trout eggs from these sources will be paid for on the basis of the number that reach the eyed stage. In March 760,000 speckled trout eyed eggs were received from the Antigonish hatchery and in June 95,500 rainbow trout eggs, also eyed, from the Crystal Lakes Fish Hatcheries, Fortine, Montana. Transfers were: 500,000 Atlantic salmon eyed eggs to the Antigonish hatchery, and 584,000 speckled and 93,200 rainbow trout advanced fry to the Cardigan rearing ponds. Seven hundred and twenty-three thousand nine hundred Atlantic salmon and 253,600 speckled trout were distributed.

Minor repairs were made to the sluiceway during the year.

The Morell Salmon Retaining Pond was in charge of Messrs. A. Tait and J. J. Hayley. The first salmon was impounded on October 12 and between that date and November 27, 500 were secured averaging 8.6 pounds in weight. Sixty-seven per cent of the salmon taken were male fish. Between November 7 and December 2, 1,089,800 eggs were secured and laid down in the Kelly's Pond hatchery. The greater part will later be transferred to Nova Scotia hatcheries in exchange for speckled trout eggs.

DEPARTMENT OF FISHERIES

STATEMENT BY SPECIES, OF LOCAL COLLECTION AND DISPOSAL OF EGGS DURING 1939

Species	Collection area	First and last eggs	Number collected	Disposal—Establishment at	Number	Totals
Atlantic salmon	Margaree pond, N.S.	Nov. 13-Dec. 11.	5,459,000	Lindloff	1,000,000	
	River Philip, N.S.	Nov. 10-Dec. 5.	2,512,800	Margaree	4,459,000	
				Cobequid	1,410,100	
				Bedford	602,700	
	Sackville river, N.S.	Nov. 7-14.	180,300	Middleton	500,000	
Kamloops trout. Sebago salmon.				Dalhousie University	172,300	
	Miramichi pond, N.B.	Oct. 20-Nov. 11.	6,226,568	Miramichi	8,000	
	New Mills pond (Chaleur Bay) N.B.	Oct. 20-Nov. 13.	1,890,737	Charlo	6,223,568	
					1,890,737	
	New Mills pond (Benjamin and Jacquet Rivers), N.B.	Oct. 13-Nov. 8.	1,256,970	Charlo	1,256,970	
Ouaniche. Rainbow trout.	St. John pond, N.B.	Oct. 28-Nov. 27.	1,312,080	Grand Falls	954,240	
				St. John	341,888	
	Morell River, P.E.I.	Nov. 7-Dec. 2.	1,089,828	Dr. A. G. Huntsman, University of Toronto.	15,952	
	Yarmouth hatchery ponds, N.S.	Nov. 6-Dec. 7.	10,000	Kelly's pond.	1,089,828	19,928,283
	Grand Lake, N.S.	Nov. 15-23.	50,000	Yarmouth.	10,000	10,000
Sockeye salmon. Speckled trout.	Chamcook Lakes, N.B.	Nov. 8-Dec. 12.	8,000	Grand Lake.	50,000	
			99,187	Grand Lake.	8,000	
	Clinch brook, York County, N.B.	Nov. 3-14.	26,000	St. John.	96,202	
	Grand Lake rearing ponds, N.S.	Nov. 24.	1,000	Atlantic Biological Station, St.		
	Antigonish hatchery ponds, N.S.	Mar. 21-May 1.	296,778	Andrews, N.B.	2,985	
Yarmouth hatchery ponds, N.S.	Yarmouth hatchery ponds, N.S.	April 6.	50,000	Florenceville.	26,000	
	St. John hatchery ponds, N.B.	May 6-9.	113,685	Grand Lake.	1,000	
	Anderson Lake, B.C.	Oct. 24-26.	1,050,000	Antigonish.	296,778	
	Antigonish hatchery ponds, N.S.	Nov. 1-Dec. 14.	5,174,894	Yarmouth.	50,000	
			(a) 3,208,300	St. John.	113,685	
Cobequid hatchery ponds, N.S.	Cobequid hatchery ponds, N.S.	Nov. 6, 1939.	19,900	Anderson Lake.	1,050,000	
	Lindloff hatchery ponds, N.S.	Jan. 11, 1940.	1,512,030	Antigonish.	8,382,994	
	McRae Lake, Richmond County, N.S.	Nov. 20-Dec. 14.	17,700	Cobequid.	1,531,930	
	Margaree hatchery ponds, N.S.	Oct. 7-16.	30,044	Lindloff.	17,700	
		Oct. 18-Dec. 6.	2,978,506	Lindloff.	30,044	
Sand Lake, Annapolis County, N.S.			(a) 858,720	Margaree.	3,137,236	
		Nov. 2-11.	90,400	Middleton.	90,400	
	Yarmouth hatchery ponds, N.S.	Nov. 10-30.	5,000	Yarmouth.	5,000	

Florenceville hatchery ponds, N.B.	Oct. 13-Dec. 22..	2, 208, 759 (a) 246, 364	Florenceville.....	2, 455, 123
St. John hatchery ponds, N.B.	Oct. 27-Nov. 30..	1, 423, 446 (a) 350, 563	St. John.....	1, 774, 009
Spears brook, Charlotte County, N.B.	Oct. 20.....	8, 721	St. John.....	8, 721
Trout brook, Charlotte County, N.B.	Oct. 20-Nov. 22..	357, 881	Atlantic Biological Station, St. Andrews, N.B.....	357, 401
Tweedie's Meadow brook, Kent County, N.B.	Nov. 9-15.....	255, 380 (b)	Miramichi.....	480 255, 380
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(a) Eggs from yearling fish.				18, 046, 408
(b) Sea-run variety.				39, 679, 341

EYED EGGS PURCHASED IN 1939

Species	Month laid down	Purchased from	Laid down in hatchery	Number paid for	Total by species
Rainbow trout.....	June.....	Crystal Lakes Fish Hatcheries, Fortine, Montana.	Lindlof.....	91, 040	186, 615
	June.....	Crystal Lakes Fish Hatcheries, Fortine, Montana.	Kelly's Pond.....	95, 575	
Speckled trout.....	December.....	American Fish Culture Company, Carolina, Rhode Island.....	Middleton.....	280, 000	
	December.....	American Fish Culture Company, Carolina, Rhode Island.....	Yarmouth.....	49, 000	
	December 1939, January 1940.....	Brookdale Trout Company, Kingston, Mass.....	Yarmouth.....	1, 174, 500	
	October, November.....	Donald Fraser, Plaster Rock, N.B.	Grand Falls.....	809, 000	
	November, December.....	Harold Watts, York, P.E.I.	Kelly's Pond.....	260, 630	
<hr/>					2, 573, 130
<hr/>					2, 759, 745

Summary of eggs received: Eggs collected 39,679,341; Eggs purchased 2,759,745: Total 42,439,086.

In the interest of economy and convenience in distribution the following transfers were made in 1939:—

Species	Stage	From	To	Number	Date received
Atlantic salmon..	(c)	(a) Bedford.....	Yarmouth.....	900,000	March 10, 16
	(d)	(a) Bedford.....	Grand Lake.....	512,000	June 9-17
	(e)	(a) Bedford.....	Grand Lake.....	100,000	June 21, 22
	(c)	(a) Cobequid.....	Nictaux Falls.....	1,200,000	March 28
	(c)	(a) Margaree.....	Antigonish.....	1,000,000	April 7
	(d)	(a) Yarmouth.....	Kejimkujik.....	250,000	May 29-June 3
	(e)	(a) Yarmouth.....	Kejimkujik.....	50,000	June 23
	(d)	(a) Nictaux Falls.....	Mersey pond.....	147,000	June 5-9
	(e)	(a) Nictaux Falls.....	Mersey pond.....	175,000	June 22-27
	(d)	(a) Nictaux Falls.....	Middleton.....	500,000	May 7-20
	(d)	(a) Nictaux Falls.....	Stevens ponds.....	200,000	June 11-24
	(c)	(a) Charlo.....	Florenceville.....	30,000	April 8
	(c)	(a) Charlo.....	Grand Falls.....	220,000	April 7, May 5
	(c)	(a) Miramichi.....	Nictaux Falls.....	500,000	April 5
	(c)	(a) Miramichi.....	Charlo.....	500,000	March 10
	(c)	(a) Miramichi.....	Florenceville.....	1,000,000	April 9
	(c)	(a) Miramichi.....	Grand Falls.....	1,000,000	March 23
	(c)	(a) Miramichi.....	St. John.....	500,000	March 15
	(c)	(a) Kelly's Pond.....	Antigonish.....	500,000	February 8
Rainbow trout....	(e)	(b) Middleton.....	Coldbrook.....	20,800	Aug. 20, Sept. 4
	(c)	(a) St. John.....	Middleton.....	98,000	May 26
	(d)	(b) Kelly's Pond.....	Cardigan.....	93,200	July 1
Speckled trout....	(c)	(a) Antigonish.....	Bedford.....	915,000	February 16
	(c)	(a) Antigonish.....	Cobequid.....	1,300,000	March 15
	(c)	(a) Antigonish.....	Lindloff.....	500,000	Feb. 21, Mar. 31
	(c)	(a) Antigonish.....	Middleton.....	400,000	February 14
	(c)	(a) Antigonish.....	Yarmouth.....	950,000	February 22
	(c)	(a) Antigonish.....	Kelly's Pond.....	760,000	March 7
	(e)	(a) Cobequid.....	Grand Lake.....	20,000	Nov. 4-13
	(c)	(a) Margaree.....	Lindloff.....	600,000	February 18
	(d)	(a) Middleton.....	Coldbrook.....	354,500	May 10-12
	(d)	(a) Yarmouth.....	Kejimkujik.....	100,000	May 5
	(c)	(a) Florenceville.....	Charlo.....	151,200	March 23
	(c)	(a) Florenceville.....	Grand Falls.....	491,400	March 8
	(c)	(a) Florenceville.....	Miramichi.....	150,000	March 14
	(d)	(a) Kelly's Pond.....	Cardigan.....	584,032	May 24-27

(a) 1938 fall collection. (b) 1939 collection. (c) eyed eggs. (d) fry. (e) fingerlings.

TAGGING AND MARKING OF FISH

The tagging of Atlantic salmon taken for fish cultural purposes, which was commenced in 1913, was continued in 1939 at three of the salmon-retaining ponds in the Maritime Provinces. The adipose and one ventral or one pectoral fin was removed from 311,400 Atlantic and seabago salmon and speckled trout before they were distributed. The object of the tagging is to add to present information in regard to the movements of the fish, frequency of spawning and the extent to which early salmon of any season return to fresh water as early fish or vice versa. The marking or fin clipping was for the purpose of gaining further information on the movements, growth and survival of hatchery product. Special reference is made to the tagging and liberation of fish from

the net operated by the Margaree Harbour Salmon Fisheries Association under "Margaree Salmon-Retaining Pond." The extent of the tagging is given in detail in the following statement:—

ADULT ATLANTIC SALMON, TAGGED BY AFFIXING ALLUMINUM TAGS TO THE DORSAL FIN, 1939

—	Number tagged	Period of tagging	Where liberated
<i>Nova Scotia</i> — Margaree pond.....	216	Sept. 19-Oct. 9.....	Margaree River, immediately above Salmon Fisheries Association Net.
River Philip pond.....	490	Nov. 13-Dec. 5.....	River Philip.
<i>New Brunswick</i> — New Mills pond.....	203	Oct. 21-Nov. 8.....	New Mills, Chaleur Bay.

RECAPTURES, 1939—ATLANTIC SALMON

MARGAREE RIVER, N.S.

Number	Weight pounds	Length inches	Condition	Sex	Date	1. Where liberated 2. Where caught
177	(d) 21	39	Clean.....		Sept. 22, 1937 Aug. 9, 1939	Margaree Pond, N.S. Mabou Harbour, Inverness County, N.S.
181	(d) 20		Clean.....		Sept. 22, 1937 Spring 1939	Margaree Pond, N.S. Pouch Cove, Newfoundland.
K310			Clean.....		Oct. 4, 1938	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	10	34	Kelt.....		June 28, 1939	Whale Cove, Inverness county, N.S.
(f)K1712			Clean.....	F	Sept. 19, 1939	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
			Clean.....	F	Oct. 9, 1939	(h) Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
(f)K1714			Clean.....	F	Sept. 19, 1939	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	(z) (u) 7	29	Clean.....	F	1939	(e) Margaree Pond, N.S.
(f)K1716			Clean.....	F	Sept. 19, 1939	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	(v) 10		Clean.....	F	Oct. 1, 1939	McDaniel pool, Margaree River, N.S.
(f)K1722			Clean.....	F	Sept. 26, 1939	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	(z) (u) 9	35	Clean.....	F	1939	(e) Margaree Pond, N.S.
(f)K1723			Clean.....	M	Sept. 26, 1939	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	(z) (u) 7	28	Clean.....	M	1939	(e) Margaree Pond, N.S.
(f)K1726			Clean.....	F	Sept. 26, 1939	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
			Clean.....	F	Sept. 27, 1939	(h) Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.

DEPARTMENT OF FISHERIES

RECAPTURES, 1939—ATLANTIC SALMON—*Continued*MARGAREE RIVER, N.S.—*Continued*

Number	Weight pounds	Length inches	Condition	Sex	Date	1. Where liberated 2. Where caught
(f)K1732			Clean.....	F	Sept. 26, 1939	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
			Clean.....	F	Sept. 27, 1939	(h) Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
(f)K1735			Clean.....	F	Sept. 27, 1939	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	7		Clean.....	F	Oct. 4, 1939	McDaniel pool, Margaree River, N.S.
(f)K1738			Clean.....	F	Sept. 27, 1939	Margaree Salmon Fisheries Association net, Margaree Harbour N.S.
	13½	35	Clean.....	F	Oct. 8, 1939	Black Rock pool, Margaree River, N.S.
(f)K1744			Clean.....	M	Sept. 27, 1939	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
			Clean.....	M	Oct. 2, 1939	(h) Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
(f)K1755			Clean.....	M	Sept. 28, 1939	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	8	28¾	Clean.....	M	Oct. 14, 1939	McKenzie pool, Margaree River, N.S.
(f)K1763			Clean.....	M	Sept. 29, 1939	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
(z) (u)	7	28	Clean.....	M	1939	(e) Margaree Pond, N.S.
(f)K1766			Clean.....	F	Sept. 29, 1939	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	5½	27	Clean.....	F	Oct. 5, 1939	Forks pool, Margaree River, N.S.
(f)K1768			Clean.....	M	Sept. 29, 1939	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
(z) (u)	8	29	Clean.....	M	1939	(e) Margaree Pond, N.S.
(f)K1774			Clean.....	M	Sept. 29, 1939	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
(z) (u)	7	30	Clean.....	M	1939	(e) Margaree Pond, N.S.
(f)K1780			Clean.....	F	Sept. 29, 1939	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
(z) (u)	8	31	Clean.....	F	1939	(e) Margaree Pond, N.S.
(f)K1782			Clean.....	M	Sept. 29, 1939	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
(r)	10		Clean.....	M	Oct. 8, 1939	Forks pool, Margaree River, N.S.
(f)K1790			Clean.....	F	Sept. 30, 1939	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
			Clean.....	F	Oct. 4, 1939	Hart pool, Margaree River, N.S.

RECAPTURES, 1939—ATLANTIC SALMON—*Continued*MARGAREE RIVER, N.S.—*Continued*

Number	Weight pounds	Length inches	Condition	Sex	Date	1. Where liberated 2. Where caught
(f)K1800 or K1900			Clean.....	F	Sept. 30, 1939 or Oct. 9, 1939	Margaree Salmon Fisheries As- sociation net, Margaree Har- bour, N.S.
	(i) (r) 10		Clean.....	F	Oct. 13, 1939	McDaniel pool, Margaree River, N.S.
(f)K1804			Clean.....	M	Oct. 1, 1939	Margaree Salmon Fisheries As- sociation net, Margaree Har- bour, N.S.
			Clean.....	M	Oct. 3, 1939	(h) Margaree Salmon Fisheries As- sociation net, Margaree Har- bour, N.S.
(f)K1831			Clean.....	M	Oct. 8, 1939	Margaree Salmon Fisheries As- sociation net, Margaree Har- bour, N.S.
	(z) (u) 7	27	Clean.....	M	1939	(e) Margaree Pond, N.S.
(f)K1832			Clean.....	M	Oct. 8, 1939	Margaree Salmon Fisheries As- sociation net, Margaree Har- bour, N.S.
	(v) 10		Clean.....	M	Oct. 13, 1939	Hatchery pool, Margaree River, N.S.
(f)K1836			Clean.....	F	Oct. 8, 1939	Margaree Salmon Fisheries As- sociation net, Margaree Har- bour, N.S.
			Clean.....	F	Oct. 9, 1939	(h) Margaree Salmon Fisheries As- sociation net, Margaree Har- bour, N.S.
(f)K1837			Clean.....	F	Oct. 8, 1939	Margaree Salmon Fisheries As- sociation net, Margaree Har- bour, N.S.
	(z) (u) 10	36	Clean.....	F	1939	(e) Margaree Pond, N.S.
(f)K1840			Clean.....	F	Oct. 8, 1939	Margaree Salmon Fisheries As- sociation net, Margaree Har- bour, N.S.
	(z) (u) 11	36	Clean.....	F	1939	(e) Margaree Pond, N.S.
(f)K1848			Clean.....	M	Oct. 8, 1939	Margaree Salmon Fisheries As- sociation net, Margaree Har- bour, N.S.
	(z) (u) 7	29	Clean.....	M	1939	(e) Margaree Pond, N.S.
(f)K1851			Clean.....	F	Oct. 8, 1939	Margaree Salmon Fisheries As- sociation net, Margaree Har- bour, N.S.
	(z) (u) 8	32	Clean.....	F	1939	(e) Margaree Pond, N.S.
(f)K1854			Clean.....	M	Oct. 8, 1939	Margaree Salmon Fisheries As- sociation net, Margaree Har- bour, N.S.
	(z) (u) 7	30	Clean.....	M	1939	(e) Margaree Pond, N.S.
(f)K1855			Clean.....	M	Oct. 8, 1939	Margaree Salmon Fisheries As- sociation net, Margaree Har- bour, N.S.
	(z) (u) 7	30	Clean.....	M	1939	(e) Margaree Pond, N.S.
(f)K1858			Clean.....	F	Oct. 8, 1939	Margaree Salmon Fisheries As- sociation net, Margaree Har- bour, N.S.
			Clean.....	F	Oct. 9, 1939	(h) Margaree Salmon Fisheries As- sociation net, Margaree Har- bour, N.S.
(f)K1866			Clean.....	F	Oct. 9, 1939	Margaree Salmon Fisheries As- sociation net, Margaree Har- bour, N.S.
	(z) (u) 8	31	Clean.....	F	1939	(e) Margaree Pond, N.S.

DEPARTMENT OF FISHERIES

RECAPTURES, 1939—ATLANTIC SALMON—*Continued*MARGAREE RIVER, N.S.—*Concluded*

Number	Weight pounds	Length inches	Condition	Sex	Date	1. Where liberated 2. Where caught
(f)K1867			Clean.....	F	Oct. 9, 1939	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	(z) (u) 12	37	Clean.....	F	1939	(e) Margaree Pond, N.S.
(f)K1876			Clean.....	F	Oct. 9, 1939	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
			Clean.....	F	1939	(e) Margaree Pond, N.S.
(f)K1892			Clean.....	M	Oct. 9, 1939	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	7		Clean.....	M	Oct. 12, 1939	Cranton bridge pool, Margaree River, N.S.
(f)K1899			Clean.....	F	Oct. 9, 1939	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	(z) (u) 8	32	Clean.....	F	1939	(e) Margaree Pond, N.S.
(f)K1906			Clean.....	M	Oct. 9, 1939	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	(z) (u) 7	30	Clean.....	M	1939	(e) Margaree Pond, N.S.
(f)K1917			Clean.....	F	Oct. 9, 1939	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	(z) (u) 11	37	Clean.....	F	1939	(e) Margaree Pond, N.S.
(f)K1919			Clean.....	F	Oct. 9, 1939	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	18	36	Clean.....	F	Oct. 14, 1939	Rock pool, Margaree River, N.S.

NICTAUX RIVER, N.S.

F6200	5½ (w)	28	Kelt..... Clean.....	F F	Nov. 5, 1936 July 1938	Nictaux Pond, N.S. Petty Harbour, Labrador.
K1065	5	28	Kelt..... Kelt.....	F F	Nov. 11, 1938 May 26, 1939	Nictaux Pond, N.S. Sandford, Yarmouth County, N.S.

RIVER PHILIP, N.S.

K1593	8	31	Kelt..... Kelt.....	F F	Nov. 13, 1938 Apr. 26, 1939	River Philip Pond, N.S. River Philip, At Oxford, N.S.
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MIRAMICHI RIVER, N.B.

F1890	7½ (u) (z) 13	28 36	Kelt..... Clean.....	M M	Nov. 8, 1937 1939	Miramichi Pond, N.B. (g) Miramichi Pond, N.B.
F1903	6½ 10 or 12	28 30	Kelt..... Clean.....	F F	Oct. 28, 1937 Aug., 1939	Miramichi Pond, N.B. Southwest Miramichi River, ½ mile below Quarryville bridge, N.B.

RECAPTURES, 1939—ATLANTIC SALMON—Continued

MIRAMICHI RIVER, N.B.—Concluded

Number	Weight pounds	Length inches	Condition	Sex	Date	1. Where liberated 2. Where caught
F1929	12 21½	31½ 37½	Kelt..... Clean.....	M M	Nov. 9, 1937 June 16, 1939	Miramichi Pond, N.B. Gulf of St. Lawrence, 12 miles Northeast of Escuminac Point, N.B.
548	15 24	35 42	Kelt..... Clean.....	F F	Nov. 1, 1937 Aug. 2, 1939	Miramichi Pond, N.B. Miramichi River, at Loggieville, N.B.
586	16	37 40	Kelt..... Kelt.....	F F	Nov. 1, 1937 May 19, 1939	Miramichi Pond, N.B. Southwest Miramichi River, at Ludlow, N.B.
624	10 21½	30 38	Kelt..... Clean.....	F F	Nov. 2, 1937 Aug. 22, 1939	Miramichi Pond, N.B. Miramichi River, north side Beaubear's Island, N.B.
632	12 18	33	Kelt..... Clean.....	M M	Nov. 2, 1937 Aug. 24, 1939	Miramichi Pond, N.B. Miramichi River, (north side), about ten miles east of New- castle, N.B.
680	12 17	32	Kelt..... Clean.....	F F	Nov. 5, 1937 June 16, 1939	Miramichi Pond, N.B. Richibucto Harbour, N.B.
683	16 18½	36½	Kelt..... Clean.....	F F	Nov. 5, 1937 Sept. 14, 1939	Miramichi Pond, N.B. Northwest Miramichi River, one half mile above hatchery, South Esk, N.B.
804	9 (aa)14 lbs. 11 ozs.	30 32	Kelt..... Clean.....	F F	Nov. 6, 1937 June 8, 1939	Miramichi Pond, N.B. Trinity bay, at Bellevue, New- foundland (½ mile off coast).
837	11 19	31 36	Kelt..... Clean.....	M M	Nov. 6, 1937 July 8, 1939	Miramichi Pond, N.B. Gulf of St. Lawrence, off Es- cuminac Point, N.B.
905	19	39 41	Kelt..... Kelt.....	F F	Oct. 30, 1937 May 4, 1939	Miramichi Pond, N.B. Cain River, one-half mile from mouth, N.B.
984	10 17	31 36	Kelt..... Clean.....	F F	Oct. 29, 1937 Aug. 14, 1939	Miramichi Pond, N.B. Wye Beach, N.B.

ST. JOHN RIVER, N.B.

K438	12½ 17	35 37½	Kelt..... Clean.....	F F	Nov. 7, 1938 July 25, 1939	St. John Pond, N.B. Two miles south from Musquash, Light, N.B.
K442	9 13½	32 34	Kelt..... Clean.....	F F	Nov. 7, 1938 July 3, 1939	St. John Pond, N.B. St. John Harbour, off Dominion Coal Dock, N.B.
K460	11 16½	32 32½	Kelt..... Clean.....	F F	Nov. 8, 1938 July 7, 1939	St. John Pond, N.B. Five to ten miles off Lyner Point Fog-horn, Lorneville, N.B.
K477	10 15½	31 34	Kelt..... Clean.....	F F	Nov. 8, 1938 July 15, 1939	St. John Pond, N.B. Bay of Fundy, seven miles south by east off Point Lepreau, N.B.
K509	9	31½ 34	Kelt..... Clean.....	F F	Nov. 8, 1938 July 4, 1939	St. John Pond, N.B. St. John Harbour, near west St. John ferry slip, N.B.

RECAPTURES, 1939—ATLANTIC SALMON—*Concluded*ST. JOHN RIVER, N.B.—*Continued*

Number	Weight pounds	Length inches	Condition	Sex	Date	1. Where liberated 2. Where caught
K537	10½	32	Kelt.....	F	Nov. 11, 1938	St. John Pond, N.B.
	(v) 14	.....	Clean.....	F	Oct. 31, 1939	Crow Head, Twillingate, Newfoundland.
K561	9	30½	Kelt.....	F	Nov. 11, 1938	St. John Pond, N.B.
	12	.....	Clean.....	F	July 5, 1939	Bay of Fundy, ten miles off Dipper Harbour, N.B.
K594	12	32½	Kelt.....	F	Nov. 11, 1938	St. John Pond, N.B.
	15	36	Clean.....	F	Aug. 4, 1939	St. John River, at Martinon, St. John County, N.B.
K700	11	33	Kelt.....	F	Nov. 12, 1938	St. John Pond, N.B.
	16	39	Clean.....	F	Aug. 12, 1939	St. John River, at Martinon, opposite No. 7 shed, N.B.
K759	12	33	Kelt.....	F	Nov. 12, 1938	St. John Pond, N.B.
	19	38	Clean.....	F	Aug. 2, 1939	Bay of Fundy, one-half mile off Manawagonish island, N.B.
K773	11	32	Kelt.....	F	Nov. 12, 1938	St. John Pond, N.B.
	11½	.....	Clean.....	F	July 25, 1939	Bay of Fundy, five miles south of Chance Harbour, N.B.
K796	10	32½	Kelt.....	F	Nov. 12, 1938	St. John Pond, N.B.
	14	34	Clean.....	F	July 11, 1939	Bay of Fundy, five miles south of Partridge Island, N.B.
K807	10	32	Kelt.....	F	Nov. 12, 1938	St. John Pond, N.B.
	14½	35	Clean.....	F	July 1939	Lorneville, St. John County, N.B.
K821	11	33	Kelt.....	F	Nov. 12, 1938	St. John Pond, N.B.
	15½	34	Clean.....	F	Aug. 3, 1939	St. John Harbour, at No. 16 shed, N.B.
K845	10	32	Kelt.....	F	Nov. 14, 1938	St. John Pond, N.B.
	13	.....	Clean.....	F	July 31, 1939	St. John Harbour, N.B.
K960	9½	31	Kelt.....	F	Nov. 15, 1938	St. John Pond, N.B.
	12	.....	Clean.....	F	July 12, 1939	St. John River, halfway from mouth to Reversing Falls, N.B.
K1008	10	31	Kelt.....	F	Nov. 15, 1938	St. John Pond, N.B.
	14½	34	Clean.....	F	June 28, 1939	Bay of Fundy, four miles southeast of Musquash Light (East head), N.B.
K1012	10	31½	Kelt.....	F	Nov. 15, 1938	St. John Pond, N.B.
	12½	32	Clean.....	F	July 12, 1939	Three miles south of Whistling Buoy, off Musquash, N.B.

(aa) Weight when dressed.

(d) Tagged and liberated without weighing or measuring, etc.

(e) Salmon caught, tagged and liberated above the Margaree Salmon Fisheries Association net Sept. 19-Oct. 9; recaptured in association's net and placed in the Margaree Salmon pond prior to October 23, 1939.

(f) Salmon tagged and liberated in Margaree River immediately above the Margaree Salmon Fisheries Association net, 1939.

(g) Caught for second time for fish cultural purposes, Sept. 12-Oct. 1, 1939.

(h) Salmon caught, tagged and liberated above the Margaree Salmon Fisheries Association net; recaptured and liberated the second time above the net.

(i) Caught and released again with same tag attached in McDaniel pool.

(u) Liberated with same tag attached.

(v) Weight estimated.

(w) Reported in 1939.

(z) Weight after stripped.

FISH MARKED BY FIN CLIPPING, 1939

	Number marked	Species	Age	Distributed	Nature of mark: Removal of
<i>Nova Scotia</i> — Antigonish hatchery.....					
	1,000	Atlantic salmon...	Fingerlings...	Oct. 21—Salmon River-Northwest branch head-waters.	Adipose and left pectoral
	100	"	"	Oct. 21—Cutler brook.	"
	50	"	"	Oct. 21—Godfrey brook.	"
	500	"	"	Oct. 21—Horton brook.	"
	250	"	"	Oct. 21—Kelly brook.	"
	500	"	"	Oct. 21—Laylor Lake, outlet.	"
	100	"	"	Oct. 21—Loch Sheelan, outlet.	"
	500	"	"	Oct. 21—Mill brook.	"
	1,000	"	"	Oct. 21—Porter River.	"
	500	"	"	Oct. 21—Shea Lake, outlet.	"
	500	"	"	Oct. 4—Cutler Lake.	"
	2,500	Speckled trout.	Yearlings...	Dec. 22—Caldor Lake.	Adipose and right pectoral
	223	"	"	Dec. 14—Coose Coffre Lake.	"
	500	"	"	Dec. 15—Copper Lake, Antigonish county.	"
	400	"	"	Jan. 12—Cutler Lake.	"
	313	"	"	Dec. 15—Dewar dam-Barney River.	"
	100	"	"	Dec. 18—Dobson Lake.	"
	600	"	"	Dec. 17, Dec. 16, 18—Donahue Lake.	"
	1,350	"	"	Dec. 15—McLean or James River Lake.	"
	400	"	"	Jan. 11, Dec. 19—Sherbrook Lake.	"
	915	"	"	Dec. 22—Caldor Lake.	"
	46	"	Two years.	Dec. 18—Dobson Lake.	"
	400	"	"	Dec. 19—Sherbrook Lake.	"
	548	"	"	Dec. 21—Stewart dam, tributary to Little Harbour.	"
	500	"	"	Dec. 22—Caldor Lake.	"
	739	"	Three years.	Dec. 15—Dewar dam-Barney River.	"
	8	"	"	Dec. 16—Donahue Lake.	"
	150	"	"	Dec. 15—McLean or James River Lake.	"
	200	"	"	Dec. 15—McLean or James River Lake.	"
	500	"	"	Dec. 21—Stewart dam, tributary to Little Harbour.	"
	200	"	Four years and older.	Dec. 15—Copper Lake, Antigonish county.	"
	192	"	"	Dec. 15—Dewar dam-Barney River.	"
	1,000	"	Fingerlings...	Aug. 19—Folly Lake.	Adipose and right ventral
	1,000	"	Yearlings...	Aug. 25—Barbour Lake.	"
	1,400	"	"	July 19—Barry's dam-Haliburton River.	"
	2,000	"	"	July 18—Blair Lake.	"
	6,091	"	"	May 22 to Nov. 24—Folly Lake.	"
	2,400	"	"	July 24—Leak Lake.	"
	600	"	"	July 23—Long Lake-French River.	"
Cobequid hatchery.....					

FISH MARKED BY FIN CLIPPING, 1939—Continued

	Number marked	Species	Age	Distributed	Nature of mark: Removal of
<i>Novæ Scotiæ</i> —Concluded (Obsequid Hatchery— <i>Concluded</i>)	3,355	Speckled trout...	Yearlings...	May 15—Mountain brook...	Adipose and right ventral
	2,400	"	"	July 21—Moose River, Cumberland County...	"
	813	"	"	May 29—River Philip...	"
	2,000	"	"	May 29—River Philip, east branch...	"
	2,000	"	"	May 29—River Philip, west branch...	"
	600	"	"	July 22—Shatter Lake...	"
	6,600	"	"	July 17 to Nov. 21—Simpson Lake...	"
	1,000	"	"	May 15—Sugarloaf brook...	"
	7,021	"	"	May 23 to Nov. 23—Sutherland Lake...	"
	1,200	"	"	June 13—Truro Reservoir, Leper brook...	"
Grand Lake rearing ponds...	2,400	"	"	Aug. 2, 3—Vickery Lake...	"
	1,997	"	"	May 19—Wallace River...	"
	2,500	"	"	May 17, 18—Wallace River, west branch...	"
	600	"	"	July 20—Whirley Wha Lake...	"
	105	"	Adults...	Dec. 2—Folly Lake...	"
	29	"	"	Dec. 14-30—River Philip, east branch...	"
	103	"	"	Nov. 18—Simpson Lake...	"
	9,291	Sebago salmon...	Two years...	Feb. 1 to June 2—Grand Lake...	Adipose and right ventral
	995	"	Three years...	May 8, 11, 20—Grand Lake...	"
	45	"	Wild...	Feb. 5—Grand Lake...	"
Lindloff hatchery...	5,995	Speckled trout...	Fingerlings...	Aug. 14—Pottic Lake (Madame island)...	Adipose and left pectoral
	35,327	Atlantic salmon...	"	Oct. and Nov.—Northeast Margaree River...	Adipose and right pectoral
	16,920	Speckled trout...	"	Dec. 5, 7—Lake O'Law...	"
	714	"	Yearlings...	Dec. 14—Lake O'Law...	"
Middleton hatchery...	308	"	Four years...	Dec. 13—Lake O'Law...	"
	530	"	Fingerlings...	Dec. 13—Lake O'Law, upper...	"
	10,000	Atlantic salmon...	"	Sept. 19—Caspereau River...	Adipose and left ventral
	2,640	Speckled trout...	"	Sept. 7—Falls Lake stillwater...	"
Yarmouth hatchery...	1,000	"	"	Aug. 14—Morton brook...	"
	1,500	"	"	Aug. 29—Scrag Lake...	"
	1,500	"	"	Aug. 14—Slocomb brook...	"
	4,000	"	"	Sept. 1—Spectacle Lake—Maligee Lake...	"
	1,500	"	"	Aug. 14—Wisswell brook...	"
	2,500	"	Yearlings...	May 12—Sixth Lake stream—Sissiboo River...	Adipose and right ventral
	8,000	Atlantic salmon...	"	Apr. 21, 1937—Clyde River...	"
	23,000	"	"	Apr. 28, June 4, 7, 1937—Mersey River...	"

New Brunswick— Florenceville hatchery....	(a)	29, 124	Atlantic Salmon....	Fingerlings...	Aug. 30, Sept. 1—Nashwaak River...	Adipose and left pectoral
		3, 484	Speckled trout....	Yearlings....	Nov. 6—Limeburner Lake....	Adipose and left ventral
		2, 390	"	"	Oct. 27, 30—Kerr Lake....	Adipose and right pectoral
		459	"	"	Oct. 30—Johnson Lake....	Adipose and right ventral
		250	"	"	Oct. 14—Brown Lake....	Adipose and left pectoral
		400	"	"	Sept. 12—Bull creek—St. John River....	"
		300	"	"	Oct. 17—Davidson Lake....	"
		300	"	"	Sept. 11—Gallivan brook—St. John River....	"
		400	"	"	Sept. 11—Big Guisguet River....	"
		400	"	"	Sept. 11—Little Guisguet River....	"
		150	"	"	Sept. 13—Hagerman brook—St. John River....	"
		500	"	"	Nov. 21—Private pond, Power creek, Mr. Zeno Martin	Adipose and both ventrals
		350	"	"	Sept. 11—McLeary brook—Lakeville pond....	Adipose and left pectoral
		300	"	"	Oct. 23—Nashwaaks River....	"
		300	"	"	Sept. 30—Pokiok River (York County)....	"
		350	"	"	Sept. 13—River de Chute....	"
		350	"	"	Oct. 11—Second Eel River Lake....	"
		300	"	"	Sept. 12—Shogomoc River....	"
		350	"	"	Aug. 31, Sept. 2—Brown Lake....	"
		200	"	Two years...	May 18—Limekiln brook—Nashwaak River....	"
		160	"	"	Sept. 7—Nashwaaks River....	"
		475	"	Three years	July 29, 31, Aug. 29—Bull creek—St. John River....	"
		500	"	"	July 21, Aug. 21, 22—Cranberry Lake....	"
		540	"	"	July 20, Aug. 2, 4, 5—Cross creek—Nashwaak River....	"
		580	"	"	June 23, 27, July 7, Aug. 1—Nashwaaks River....	"
		350	"	"	July 3, 27, 31—Pokiok River (York County)....	"
		300	"	"	May 31, July 4, Aug. 29—Second Eel River Lake....	"
		325	"	"	July 28, Aug. 31—Shogomoc River....	"
		300	"	"	Aug. 23, 26—Tay creek....	"
		100	"	Four years...	Aug. 3—Hagerman brook—St. John River....	"
		100	"	"	July 3—Pokiok River (York County)....	"
		250	"	"	June 29, 30—River de Chute....	"
		100	"	"	July 4—Second Eel River Lake....	"
		200	"	"	July 5, Sept. 1—Tinkettle brook—Nashwaak River....	"
		200	"	Six years...	May 25, June 15—Gillespie Lake....	"
		182	"	"	June 15, 17—Big Guisguet River....	"
		200	"	"	May 31, June 10—Little Guisguet River....	"
		100	"	"	June 16—Hardwood brook—St. John River....	"
Grand Falls hatchery.....	(a)	15, 000	Atlantic salmon....	Fingerlings...	Sept. 16—St. John River, at Aroostook....	Adipose and right pectoral
	(a)	10, 000	"	"	Sept. 23—St. John River, at Inman flats....	"
	(a)	11, 300	"	"	Sept. 27—Salmon River headwaters....	"
	(a)	5, 000	"	"	Sept. 15—Tobique River, at Millers....	"
Miramichi hatchery.....	(a)	10, 000	"	"	Aug. 19—Kouchibouguac River....	Adipose and right ventral
		2, 200	Speckled trout....	Fingerlings...	Aug. 23—Pabineau Lake....	"
	(a)	2, 495	"	"	Aug. 19—Salmon River (Kent County)....	"
		6, 600	"	"		

FISH MARKED BY FIN CLIPPING, 1939—*Concluded*

—	Number marked	Species	Age	Distributed	Nature of mark: Removal of
<i>New Brunswick</i> — <i>Concluded</i> St. John hatchery.....	150 300 300 280 300 180 200 350 250	Speckled trout " " " " " " " " " " " " " " Speckled trout	Yearlings.... " " " " " " " " " " " " " " Raidon brook, (Wild).	Nov. 24—Elderly brook-Little River..... Nov. 28—Leonard pond-Deer island..... Dec. 9—Loch Lomond..... Dec. 5—Long Lake (Queens County)..... Dec. 7—Mispeck River..... Dec. 6—Robinson Lake..... Nov. 25—Lily Lake-Rockwood park..... Oct. 26—Red Rock Lake..... Dec. 8, 1938—Beaver Lake.....	Adipose and left ventral " " " " " " " " " " " " Adipose and right pectoral Left pectoral
District Supervisor of Fish Culture, St. John, N.B.	250 430	" " Sebago salmon.....	" " Two years...	Dec. 8, 1938—Ping Pong Lake..... Nov. 24—Mouth of Meadow brook, tributary to First (Hamcook Lake).	" " Right ventral
Atlantic Biological Station, St. Andrews, N.B.	2,000 2,000	" " " "	Fingerlings.... " "	Oct. 21—Black River-Covehead Bay..... Oct. 26—Cardigan River, between Fishery and Alley's dams.	Adipose and left pectoral " "
<i>Prince Edward Island</i> — <i>Cardigan</i> Rearing ponds....	6,000	" "	" "	Oct. 25—Watt's stream—Winter River.....	" "
Total.....	311,467				

(a) Restigouche stock.

The percentage of marked trout that have been reported from different districts varies greatly in relation to the number that were marked. In some districts the anglers and residents do not seem to be interested to a sufficient extent to go to the trouble of reporting the capture of marked fish to the department, or to the nearest fishery officer.

The following numbers of marked fish were reported during 1939:—

REPORTED RECAPTURES OF FISH WITH FINS MISSING

Where recaptured	Number	Species	Date	Distributed from	Fins missing
Coore Coffre Lake.....	7	Speckled trout.....	Angling season, 1939.....	Antigonish hatchery...	Adipose and right pectoral
Copper Lake (Antigonish county).....	80	"	"	"	"
Cutler Lake.....	300	"	"	"	"
Dewar dam-Barney River.....	62	"	"	"	"
Dobson Lake.....	40	"	"	"	"
Donahue Lake.....	300	"	"	"	"
East River, at McDonald dam and four miles upstream.....	30	"	"	"	"
Sherbrook Lake.....	71	"	"	"	"
Simon Lake.....	40	"	"	"	"
Stewart dam on tributary to Little Harbour.....	300	"	"	"	"
Hart Lake.....	400	"	Apr. 15-Aug. 31, 1939.....	Cobequid hatchery...	Adipose or right ventral
River Philip, East branch.....	7	"	June 24, July 3, 1939.....	"	Adipose and right ventral
Simpson Lake.....	40	"	July 29, 1939.....	"	"
Sutherland Lake.....	31	"	July 6, 7, 1939.....	"	"
Mersey River.....	1	"	July 3, 1939.....	Yarmouth hatchery.....	"
Upper part of Lake O'Law brook and Lakes.....	182	"	Angling season, 1939.....	Margaree hatchery.....	Adipose and right pectoral
Sand Lake.....	20	"	Oct. 26-Nov. 14, 1938.....	Middleton hatchery.....	Adipose and left ventral
Sand Lake.....	23	"	Oct. 25-Nov. 4, 1939.....	"	"
Sand Lake, outlet.....	15	"	Angling season, 1939.....	"	"
Chamcook Lakes.....	22	Sebago salmon.....	Nov. 3-21, 1939.....	St. John hatchery.....	Adipose and right pectoral
Private Pond, Power Creek Mr. Zeno Martin.....	200	Speckled trout.....	Angling season, 1939.....	Florenceville hatchery.....	Adipose and left pectoral
Ping's Pond.....	over 70	"	"	St. John hatchery.....	Right pectoral
Beaver Lake.....	20	"	"	Direct from Rairdon brook.....	Left pectoral
Mispek River.....	4	"	"	"	"

(a) Wild stock from Rairdon brook.

The recaptures of marked trout reported from the Antigonish area up to the close of the angling season in 1939 represents 18.6 per cent of the number marked and distributed from the hatchery from 1935 to the end of January 1939. The respective percentage recaptures of the marked fish distributed in the several lakes and streams in this district vary considerably, as shown in the following summary:

Water	Number marked fish distributed	Number recaptured	Percentage recaptured
Campbell Lake-River John.....	900	24	2.7
Cooee Coffre Lake.....	1,300	465	35.7
Copper Lake (Antigonish county).....	1,200	365	30.4
Cutler Lake.....	813	700	86.1
Dewar dam-Barney River.....	250	62	24.8
Dobson Lake.....	468	165	35.3
Donahue Lake.....	2,000	702	35.1
Grant Lake.....	200	36	18.0
James River Lake or McLean Lake.....	1,200	560	46.6
Long Lake-East River St. Mary.....	3,504	77	2.2
McDonald dam-East River.....	200	30	15.0
Sherbrook Lake.....	2,015	489	24.3
Simon Lake.....	690	213	30.8
South River Lake.....	1,816	69	3.8
Stewart dam on tributary to Little Harbour.....	2,075	1,113	53.6
Trout Lake.....	200	40	20.0
West River.....	3,100	22	.7

In addition to recaptures mentioned in the above statement some fish (number unknown) were caught in Halfway run in 1939. These may have come from Dobson or Cooee Coffre Lake.

The 400 marked trout from Hart Lake were wild fish that had been marked after spawning operations in the fall of 1937 and 1938.

The Mersey River trout had travelled seven miles downstream from Kejimikujik Lake, where they were distributed.

The twenty-two sebago salmon recaptured at Chamcook Lakes were taken in the stream connecting the two lakes during egg-collecting operations in 1939. The numbers of marked sebago salmon thus taken indicate that hatchery fish go a long way towards maintaining such angling as there is for this species in the Chamcook Lakes. Marked fish made up the following percentages of the numbers handled for fish cultural purposes: 1939, 19.6; 1938, 39; 1937, 24; and 1936, 39.

The recaptures of marked trout at Ping's pond and Beaver Lake, and the Mispik River tributary to Beaver Lake are returns from stunted speckled trout taken from Rairdon brook, and distributed in these lakes.

NOVA SCOTIA
ANTIGONISH HATCHERY

	Atlantic salmon				Rainbow trout	Speckled trout							
	Advanced Fry	Fingerlings			Fingerlings No. 2	Fingerlings				Yearlings	Two years	Three years	Old fish
		No. 1	No. 2	No. 3		No. 1	No. 2	No. 3	No. 5				
Antigonish Co.—													
Beaver Meadow River.....						70,000							
Black River.....						20,000							
Brierly brook.....						20,000							
Copper Lake.....						30,000				400			200
Glenroy River.....						50,000							
James River.....	30,000	50,000				10,000				400	200		
McLean or James River Lake.....						15,000							
Maryvale brook.....						50,000							
Meadow Green River.....						25,000							
North Lake.....						25,000							
Polson brook-South River.....													
Rights River.....		50,000				25,000							
South Lake.....													
South River.....		50,000		1,730		60,000							
South River Lake.....						10,000							
Springfield brook-Glenroy River.....						85,000						749	599
West River.....													
Guysborough Co.—													
Canter Lake.....							3,000						
Cole Harbour Lake.....						30,000		3,500					
Coose Cofire Lake.....						40,000		1,500		500			
Country Harbour River.....		80,000											
Cudahys Lake.....								3,000					
Cutler Lake.....						10,000		2,500		313			
Cutler brook.....				100									
Dobson Lake.....						40,000				600	400		
Donahue Lake.....						55,000				1,350	150		
Doyle Lake.....						10,000							
Ecum Secum River.....						50,000							
Eight Island Lake.....						15,000							
Godfrey brook-Salmon River.....				50									
Goldboro or Goldbrook Lake.....													
Goose Island Lake.....						15,000							
Guysborough River.....							3,000						
Hazel Hill Lake.....		35,000				40,000							

ANTIGONISH HATCHERY—*Concluded*

	Atlantic salmon				Rainbow trout	Speckled trout									
	Advanced Fry	Fingerlings				Fingerlings					Year-lings	Two years	Three years	Old fish	
		No. 1	No. 2	No. 3		No. 1	No. 2	No. 3	No. 5						
Guysborough Co.— <i>Concluded</i>															
Horton brook-Salmon River.....				500											
Indian Harbouro Lake.....						40,000									
Yellow Lake.....				250		15,000									
Kelly brook-Salmon River.....						10,000									
Lawlor Lake.....				500											
Lawlor Lake, outlet.....				100											
Loch Sheelan, outlet.....															
Loch Sheil.....										800					
Long Lake-East River St. Mary.....										3,500					
Long Lake-Salmon River.....						20,000									
Loon Lake-New Harbour River.....										3,000					
McPherson Lake (Port Shoreham)				500						2,538					
Mill brook-Salmon River.....						10,000									
Narrow Lake.....						10,000									
Nickerson Lake.....				1,000											
Porter River.....						10,000									
Round Lake (North Ogdén).....	100,000	290,000													
East River St. Mary.....	100,000	150,000													
West River St. Mary.....			100,000			30,000									
Salmon River.....				1,000		15,000									
Salmon River, Northwest branch.....															
Seal Harbour Lake.....				500		40,000				915	548				
Shea Lake, outlet.....															
Sherbrook Lake.....															
Smelt Lake.....						57,225									
Square Lake-Salmon River.....						20,000									
Tracadie River.....	75,000						5,000								
Trout Lake-East River St. Mary.....															
<i>Pictou Co.—</i>															
Barney River.....	30,000	80,000				10,000		3,000							
Big brook-East River.....								1,500							
Black River-River John.....						50,000									
Brora Lake.....						45,000		5,000	223	46	739				
Caldar Lake.....								3,000							
Campbell Lake-French River.....															
Big Caribou River.....															
Little Caribou River.....							6,000								
							4,000								

BEDFORD HATCHERY

	Atlantic salmon		Speckled trout Fingerlings No. 1
	Advanced fry	Fingerlings No. 1	
<i>Colchester County—</i>			
D'Armand Lake.....			32,000
Pembroke River.....		70,000	
Stewiacke River, south branch.....	35,000		
<i>Halifax County—</i>			
Brown Lake-Musquodoboit River.....			32,000
Conrod Lake.....			32,000
Fraser Lake-Nine Mile River.....			32,000
Joe Cook Lake-Musquodoboit River.....			32,000
Lewis Lake-East River.....			32,000
Meisener Lake.....			50,000
Oyster pond.....			32,000
Portuguese Cove Lake.....			32,000
Quillian Lake.....			32,000
Rawdon River.....		150,000	
Salmon River (Port Dufferin).....		70,000	
Scrappy Lake.....			18,000
Little Second Lake-Nine Mile River.....			10,340
Little Sheldrake Lake.....			32,000
Little West River-Sheet Harbour.....	35,000		
<i>Hants County—</i>			
Campbell brook-Kennetcook River.....		50,000	
Coxcomb brook.....			32,000
Nix Lake.....			18,000
Pigot Lake.....			32,000
<i>Lunenburg County—</i>			
Corkum Lake.....			32,000
Gold River, upper.....		70,000	
Meadow Lake brook.....			32,000
Middle River.....	70,000	72,740	
Sabity pond-Middle River.....			32,000
Spectacle Lake-Chester.....			30,000
Spondo Lake inlet.....			20,000
	140,000	482,740	626,340

Total distribution..... 1,249,080

COBEQUID HATCHERY

	Atlantic salmon			Speckled trout					
	Fry	Advanced fry	Fingerlings No. 1	Fingerlings				Yearlings	Old fish
				No. 1	No. 2	No. 3	No. 4		
Experimental pond (Job's), Wittenburg..					2,000				
<i>Colchester County—</i>									
Bass River, at Five Islands.....				15,000					
Chain Lake brook-Economy River.....					5,000				
Chiganois River.....					15,000		3,000		
Debert River.....			85,000						
Debert River, headwaters.....				15,000			3,000		
East River, at Five Islands.....				15,000					
Economy River.....		60,000	25,000						
Economy Lake.....				10,000					
Folly River.....		60,000	25,000						
Folly Lake.....					25,000	10,000		6,900	105
French River.....					15,000	5,000			
Gamble Lake.....					10,000				
Great Village River.....		60,000	25,000						
Hart Lake.....						10,000			
Long Lake-French River.....								600	
McCallum Lake.....				10,000					
Moose Lake-Economy River.....					5,000				
Newton Lake.....				10,000					
North River, near Truro.....			100,000						
Portapique River.....			85,000						
Salmon River.....			100,000						
Shatter Lake.....								600	
Silica Lake or Bass River Lake.....				15,000					
Simpson Lake.....				30,000		5,000		6,900	103
Truro Reservoir, Leper brook.....								1,200	
Waugh's River.....					15,000	5,000			
West Branch Lake-River Philip.....						10,000			
Whirley Wha Lake.....								600	
<i>Cumberland County—</i>									
Apple River.....			50,000						
Barbour Lake.....								1,000	
Biswanger brook-Tillie creek.....				10,000					
Black River.....				15,000					
Blair Lake.....								2,000	
Dead Lake.....				5,000					
East River-Maccan River.....				15,000					
Fountain Lake.....				25,000					
Fox River (Greville Bay).....				15,000					
Gilbert Lake.....				15,000			1,500		
Gleason brook-Portapique River.....				10,000					
Harrison Lake.....				15,000					
Isaac Lake.....				15,000	10,000		2,500		
Leak Lake.....								2,400	
Little Black Lake.....							1,200		
Little Lake-Newfound Lake.....				5,000					
McAloney Lake.....				15,000			1,500		
McLellan pond-La Planche River.....						15,000			
Maccan River.....	70,000		30,000						
Maccan River, south branch.....				15,000		2,500			
Maccan River, west branch.....				15,000		2,500			
Moose River.....								2,500	
Mountain brook.....				15,000		5,000		3,355	
Newfound Lake.....				20,000	5,000		2,500		
Parrsboro Aboiteau.....				15,000			1,500		
Poison Lake.....				5,000					
Polly brook.....				10,000					
Pugwash River.....				15,000		5,000			
Ramshead River.....				15,000					
Ramshead Lake.....					10,000				
River Philip.....	70,000	70,000	255,000				6,000	1,000	
River Philip, east branch.....				10,000	12,000			2,000	29
River Philip, west branch.....				10,000		6,000	1,000	2,000	
Shinimikas River.....			70,000						
Sugarloaf brook.....				10,000		5,000		1,000	
Sutherland Lake.....					15,000			7,708	
Sutherland Lake outlet.....							3,000		
Tidnish River.....			40,000						
Tillie creek.....				10,000		5,000			
Vickery Lake.....					15,000			2,400	
Wallace River.....	70,000		85,000	15,000		5,000	2,000	2,500	
Wallace River, west branch.....				15,000		5,000	2,000	2,500	
Webb Lake.....				10,000					
<i>Pictou County—</i>									
Barry's Dam-Haliburton River.....					15,000			1,400	
River John.....									
<i>Westmorland County—</i>									
Chapman brook.....					10,000				
Clarkson brook-Tantramar River.....					5,000				
Gasperon River.....					10,000				
Lac Ste. Emile.....						1,000			
Little Shemogue River.....					10,000				
Robson brook-Tantramar River.....					5,000				
Tait brook-Memramcook River.....					10,000				
	210,000	250,000	1,005,000	485,000	224,000	102,000	30,700	50,563	237

Total distribution..... 2,357,500

COLDBROOK PONDS

	Rainbow trout Fingerlings No. 3	Speckled trout Fingerlings	
		No. 3	No. 4
<i>Kings County—</i>			
Aylesford Lake.....			50,000
Cornwallis River.....			1,135
Gaspereau Lake.....		3,000	
Habitant River.....			1,000
Hardwood Lake.....			3,000
Lake Paul.....		10,000	10,000
Lake Torment.....		5,000	
Nimchin Page Lake.....			3,000
Trout River.....		3,000	
Sunken Lake.....	20,865		
	20,865	21,000	68,135
Total distribution.....		110,000	

GRAND LAKE PONDS

	Atlantic salmon Fingerlings			Sebago salmon		Speckled trout Yearlings
	No. 2	No. 3	No. 4	Two year	Three year	
<i>Halifax County—</i>						
Big Salmon River.....		18,000				
Chezzetcook River.....		28,000				
Eagle Lake-Partridge run.....				9,300	995	700
Grand Lake.....						
Higgins brook.....		18,000				
Big Indian Lake (Prospect Bay)...						700
Ingram River.....		28,000				
Kieley Lake.....						700
Long Lake-Shubenacadie River.....						700
Long Lake-Lake Major.....						700
Loon Lake-Lake Charles.....						800
McGrath Lake.....						700
Meadow Lake-Musquodoboit River...						700
Moser River.....	10,000					
Musquodoboit River.....		18,000				
Nine Mile River.....		18,000				
Partridge run.....		14,000				
Quoddy River.....			7,000			
Ragged Lake (Prospect Bay).....						700
Rawdon River.....		40,000				
Russell or McDonald Lake.....						700
Sackville River.....		32,000				
Salmon River (Jeddore Harbour)...		14,000				
Salmon River (Port Dufferin).....		28,000				
Ship Harbour Lake.....		28,000				
Spider Lake.....						760
West River-Sheet Harbour.....		14,000				
William or First Lake.....						700
<i>Hants County—</i>						
Cameron Lake.....						700
Kennetcook River.....		18,000				
Pembroke River.....		28,000				
<i>Lunenburg County—</i>						
Cranberry Lake (Mill Cove).....						700
Gold River.....		28,000				
Middle River.....		28,000				
	10,000	400,000	7,000	9,300	995	9,960
Total distribution.....						437,255

KEJIMKUJIK PONDS

	Atlantic salmon Fingerlings		Speckled trout Fingerlings			
	No. 1	No. 3	No. 1	No. 2	No. 3	No. 4
<i>Annapolis County—</i>						
Fairy Lake.....				2,000		
Little River.....			5,000	2,000		
Maitland River.....				5,000		
Mount Tom brook.....			5,000			
Roger brook.....			2,000	2,000		
West River.....			8,000	2,000		
<i>Queens County—</i>						
Fifteen Mile brook.....					4,000	
Grafton Lake.....			3,000			
High Lake.....				2,000		
Kejimkujik Lake.....			22,000	10,000		
McGinty Lake.....						1,010
Medway River.....	100,000	200,000				
Snake Lake.....				2,000		
	100,000	200,000	45,000	27,000	4,000	1,010

Total distribution..... 377,010

LINDLOFF HATCHERY

	Atlantic salmon Fingerlings		Rainbow Trout Fingerlings No. 2	Speckled trout Fingerlings			
	No. 1	No. 2		No. 1	No. 2	No. 3	No. 4
<i>Cape Breton County—</i>							
Canoe Lake.....					20,000		
Catalone Lake.....							10,000
Chain Lakes-Mira River.....					16,082		
Gaspereau River.....		161,000					
Gillie Lake.....					18,000		
Grand Lake-Indian Bay.....					10,000		
Grand Lake (Louisburg).....					15,000		
Hardy Lake.....					20,000		
Kelvin Lake.....					15,000		
Lever Lake.....			83,970				
McCormack Lake.....					25,000		
Meadow brook-Sydney River.....					15,000		
Salmon River.....	115,000	216,122					
Stewart Lake.....					15,000		
<i>Richmond County—</i>							
Black River.....				40,000			
Breen Lake.....				40,000			
Buchanan Lake.....				25,000			
Chain Lakes (Madame Island).....				50,000			
Ferguson Lake.....				50,000			
Ferguson brook.....				10,000			
Grand Lake (Madame Island).....				73,418			
Grand River.....	80,000	30,000					
Lake Above.....				25,000			
Loch Lomond.....	190,000	101,000					
McIsaac Lake.....				40,000			
McKenzie Lake.....						37,000	1,000
Mary Ann's Lake.....				20,000			
Mill Lake-East River Tillard.....				45,000			
Pottie Lake (Madame Island).....						37,000	5,995
River Tillard, east.....				30,000		4,138	
River Tillard, west.....				70,000			
St. Esprit Lake.....				25,000			
Seaview Lake.....				50,000			
Shaw Lake (Madame Island).....				40,000			
Thompson Lake.....				20,000			
	385,000	508,122	83,970	653,418	169,082	78,138	16,995

Total distribution..... 1,894,725

MARGAREE HATCHERY

	Atlantic salmon					Speckled trout					Year- lings	Two years	Four years
	Ad- vanced fry	Fingerlings				Fingerlings							
		No. 1	No. 2	No. 3	No. 4	No. 1	No. 2	No. 3	No. 4	No. 5			
Cape Breton Co.—													
Bell Lake.													
Black brook—Mira River.											10,000		
Brown Lake—Indian Bay.											10,000		
Catalone Lake.											20,000		
Ferguson Lake.											10,000		
Forrester Lake.												10,000	
Gillie Lake.											10,000		
Giovanetti Lake.											10,000		
Grand Lake—Indian Bay.											20,000		
Grand Lake, near Louisburg.											10,000		
Jackson Lake.											10,000		
Keete Lake.											10,000		
McDonald or Widow Lake.										15,000			
McInnes Lake.											10,000		
McIntyre Lake.											20,000		
McPherson Lake.											10,000		
Meadow brook—Sydney River.										15,000			
Scotch or Scott Lake.												10,000	
Stewart Lake.													
Trout brook—Mira River.										7,500			
Dalem Lake (Boularderie island).										15,000			
Inverness Co.—													
Captain John's brook.													
Cheticamp River.		215,000								10,000			
Chisholm brook.										10,000			
Farm brook.										20,000			
Gallant brook.									60,000				
Glen brook—River Denys.										18,580			
Graham brook.										10,000			
Grand Etang brook.										21,100			
Horton Lake.												10,000	
Little Judique River.										10,000			
Northeast Mabou River.										20,000			
Southwest Mabou River.										20,000			
Northeast Margaree River—													
Between Black Rock and Old bridge pools.				10,000									
Big brook.										60,000			
Big Intervale bridge.	200,000			20,000	6,000							4,000	
Black Rock pool.		50,000											
Cramton bridge.	200,000			5,000									
Doyle's bridge.		50,000			4,000								
Egypt brook.									50,000				
Ethridge pool.		37,500		5,000	4,000							3,000	
Forest Glen brook.									60,000				
Garden pool.		37,500			4,000							6,000	
Hart pool.		50,000			6,000								

[illegible]

MARGAREE HATCHERY—Continued

—	Atlantic salmon				Speckled trout								
	Ad- vanced fry	Fingerlings				Fingerlings					Year- lings	Two years	Four years
		No. 1	No. 2	No. 3	No. 4	No. 1	No. 2	No. 3	No. 4	No. 5			
Middle River.....	100,000	40,000				50,000							
Beaver brook.....							20,000				2,000		
Black brook.....							20,000						
Cold brook.....						60,000							
Indian brook.....						40,000							
McDonald brook.....													
McLennan's bridge.....													
North River.....	100,000	115,000	30,000						15,000				
Church brook.....									15,000				
Tarbot Lake.....										20,000			
South Gut brook.....										15,000			
Washabuck River.....													
	1,400,000	995,000	280,000	135,000	105,146	943,766	355,852	150,000	190,000	127,763	1,715	808	530

Total distribution..... 4,655,580

MERSEY RIVER PONDS

Queens Co.—	Atlantic salmon
Mersey River	Fingerlings
	No. 3
	106,100
Total distribution	106,100

DEPARTMENT OF FISHERIES

MIDDLETON HATCHERY—*Concluded*

	Atlantic Salmon Fingerlings			Rainbow Trout Fingerlings		Speckled Trout Fingerlings			
	No. 1	No. 2	No. 3	No. 1	No. 2	No. 1	No. 2	No. 3	No. 4
Venot pond							6,000		
Wentzell Lake								8,000	
West or Rocky Lake-Ohio River							8,000		
Whalen Lake							15,000		
Whetstone Lake							15,000		
Wiles stillwater-LaHave River							6,000		
Wiles Lake (Midville)								10,000	
Wiles (Oakhill) Lake				20,000	18,000				
<i>Queens Co.</i> — Christopher Lake								10,000	
Redwater Lake									10,000
	72,500	125,000	245,000	20,000	18,000	209,600	465,000	321,000	55,000

Total distribution..... 1,531,100

NICTAUX FALLS REARING STATION

	Atlantic salmon	
	Advanced fry	Fingerlings No. 1
<i>Annapolis Co.</i> — Annapolis River		80,000
Fales River		8,000
Nictaux River	25,000	65,000
<i>Kings Co.</i> — Cornwallis River		20,000
<i>Lunenburg Co.</i> — Gold River		70,000
La Have River		65,000
	25,000	308,000

Total distribution..... 333,000

YARMOUTH HATCHERY

	Atlantic salmon			Kamloops trout		Rainbow trout			Speckled trout						
	Fry	Advanced fry	Finger-lings No. 3	Year-lings	Finger-lings No. 1	Three years	Finger-lings No. 3	Year-lings	Three years	Six years	Advanced fry	Fingerlings		Yearlings	
—												No. 1	No. 2	No. 4	
<i>Digby Co.</i> —															
Babine Meadows.....											15,000				
Belliveau Cove River.....											20,000				
Dean brook.....											25,000				
Doucette brook.....											10,000				
Grosses Coques River.....											10,000				
Meteghan River.....		35,000									10,000				
Payson's Meadow.....											90,000				
Riviere a Margo-Meteghan River.....											30,000				
Salmon River.....	150,000										50,000	15,000			
Silver River.....			9,500								25,000				
Sixth Lake stream-Sissiboo River.....															2,500
Sullivan Flowage.....															
Wentworth Lake.....											20,000				
<i>Queens Co.</i> —															
Medway River.....				1,500											
Tupper Lake.....								3,600							
<i>Shelburne Co.</i> —															
Clyde River.....	150,000		10,000												
Puget Lake.....							20,000								
<i>Yarmouth Co.</i> —															
Argyle River.....										13	30,000				
Brazil Lake.....									220		10,000				
Burrell brook.....											100,000				
Carleton River.....											40,000				
Coldstream River.....											30,000				
East branch-Tusket River.....														9,200	
Granite Lake.....											30,000				
Little River-Tusket River.....											20,000				
Big Meadow brook.....											20,000				
Mood brook-Salmon River.....											10,000				
Ryerson brook-Carleton River.....											65,000				
Tusket River.....					8,250	120									
Lake Ulley.....															
	300,000	35,000	19,500	1,500	8,250	120	20,000	3,600	220	13	650,000	20,000	15,000	9,200	2,500

Total distribution..... 1,084,903

NEW BRUNSWICK

FLORENCEVILLE HATCHERY

	Atlantic Salmon			Speckled Trout								
	Advanced Fry	Fingerlings		Advanced Fry	Fingerlings			Yearlings	2 Years	3 Years	4 Years	6 Years
		No. 1	No. 2		No. 1	No. 2	No. 5					
<i>Carlisle Co.</i> —												
Beaguinec River.....	50,000	100,000	106,000		35,000			400				182
Big Guisquit River.....					35,000			400				200
Little Guisquit River.....												
Big Presquille River.....		110,000	25,038									
Little Presquille River.....		50,000										
Bogan brook-Southwest Miramichi River.....		10,000										
Bobby brook-St. John River.....					45,000	3,000		400		475		
Bull creek-St. John River.....					10,000	6,000						
Bull creek-Eel River.....						1,000						
Burpee brook-Presquille River.....												
Buttermilk creek-St. John River.....				25,000								
Carr Lake.....												
Clearwater brook-Southwest Miramichi River.....		15,000			10,000	5,000						
Colton brook-Shiktahawk River.....						1,500		300				
Debec brook-St. John River.....					7,000							
Dingee brook-St. John River.....					10,000			150			100	
Gallivan brook-St. John River.....					15,000							
Gibson creek dead water-St. John River.....					6,000							
Hagerman brook-St. John River.....					15,000			350				
Hardwood brook-St. John River.....					10,000							
McLeary brook-Lakeville pond.....					15,000							
Mallory brook-St. John River.....												
Maynes brook-Little Presquille River.....												
Meduxneke River.....		110,000	106,000			1,000						
Mile brook-St. John River.....												
Southwest Miramichi River, north branch.....		160,000	106,000									
Southwest Miramichi River, south branch.....		110,000	176,000									
Monquart River.....		60,000										
Priest brook-Monquart River.....					40,000	5,000		350			250	
River de Chute.....												
Shiktahawk River.....		40,000										
Simpson brook-Southwest Miramichi River.....		10,000										
Smith brook-Beguinec River.....					5,000							
Teague brook-Southwest Miramichi River.....												
Tweedie brook-St. John river.....		15,000				3,000						
<i>Charlotte Co.</i> —												
Kerr Lake.....								2,390				
Johnson Lake.....								459				
Limeburner Lake.....							3,484					
<i>Madawaska Co.</i> —												
Private pond, Power creek, Mr. Zeno Martin.....												
<i>Victoria Co.</i> —												
Gillespie Lake-St. John River.....								500				200

DEPARTMENT OF FISHERIES

CHARLO HATCHERY

	Atlantic salmon fingerlings		Speckled trout fingerlings	
	No. 1	No. 2	No. 1	No. 3
Charlo River, south branch.....				645
Charlo River, north branch.....				20,000
Christopher brook.....				5,000
Black brook.....				5,000
Eel River.....				10,000
Jacquet River.....	135,000			
Loch Lomond.....			4,000	
Louison creek.....				10,000
Middle River.....	60,000			
Nipisiguit River.....	250,000			
Restigouche River.....	116,296	564,379		
Kedgwick River.....		99,000		
Little Main River.....		146,000		
Matapedia River.....		266,000		
Upsalquitch River.....		160,000		
Walker brook.....				5,000
	561,296	1,235,379	4,000	55,645

Total distribution..... 1,856,320

GRAND FALLS HATCHERY

	Atlantic salmon fingerlings			Speckled trout				
	No. 1	No. 2	No. 3	Fry	Advanced fry	Fingerlings		
						No. 1	No. 2	No. 3
<i>Salmon River—Victoria Co.—</i>								
Salmon River flats.....	15,000							
Salmon River headwaters.....		105,000	48,000					
Salmon River, at Estey camp.....	45,000							
Salmon River, at Guimont lodge.....	30,000							
Salmon River, at Power's camp.....	15,000	12,000						
Aubin crossing.....	30,000							
Big bogon.....	20,000							
Boat Landing.....		45,000	10,310					
Cote Mill.....	85,000		20,000					
Cyr flats.....	45,000	45,000						
Danish Mill.....	80,000	45,000						
Davis Mill.....	40,000							
Iron bridge.....	10,000							
Little Salmon River.....	90,000	12,000						
Mooney brook.....				11,000		10,000		
Sullivan flats.....	15,000							
Sutherland brook.....				75,000		50,000		46,130
<i>St. John River—Victoria Co.—</i>								
Andover.....	45,000	30,000						
Andover bar.....	40,000							
Andover, lower.....		30,000						
Aroostook.....		30,000						
Aroostook bar.....	175,000							
Aroostook River, mouth of.....		20,000						
Boutout brook.....				10,000				5,000
Cliffordvale.....	15,000							
Coronation.....	15,000							
Costigan Point.....	15,000							
Falls brook.....								4,215
Four Falls brook.....						20,000		8,000
Gallagher flats.....	15,000							
Hatchery brook, above falls.....						5,000		5,000
Hatchery brook, below falls.....						7,160		
Hitecock flats.....	15,000							
Inman flats.....	110,000	15,000						
Kilburn.....	145,000							
Kilburn ferry.....	40,000							
Limestone.....		24,000						
McLaughlin flats.....	15,000							
Morrill.....	45,000	12,000	10,000					

GRAND FALLS HATCHERY—*Concluded*

	Atlantic salmon fingerlings			Speckled trout				
	No. 1	No. 2	No. 3	Fry	Advanced fry	Fingerlings		
						No. 1	No. 2	No. 3
Muniac, lower.....	30,000							
Muniac, upper.....	40,000							
Ortonville.....	30,000	24,000						
Perth.....	80,000	30,000						
Perth, lower.....	90,000							
Pokiok brook.....								36,000
Trout brook.....						10,000		
Undine.....		12,000						
Watson flats.....	15,000							
<i>Tobique River—</i>								
Arthurette.....	70,000		26,405					
Arthurette bridge.....		30,000						
Forks.....			20,000					
Gear flats.....		12,000						
Haley brook.....		30,000						
Millers.....		30,000						
Millers bogam.....		30,000						
Red Rapids.....	30,000							
Fraser's dead water—Three brooks.....					10,000			
Three brooks, below dam.....						50,000		
Tobique River, mouth of.....	15,000							
Two brooks.....		60,000						
Watson bogam.....		30,000						
<i>Madawaska Co.—</i>								
Baker brook.....							40,000	
Baker Lake.....						34,000	12,000	
Grand River.....						85,000		
Green River.....								36,000
Iroquois River.....							24,000	24,000
Ledges pond.....						7,000		
Little River.....				60,000		150,000		75,000
Poitras brook.....				10,000		15,000		
Ryan brook.....				15,000		50,000		
Six Mile brook.....				10,000		10,000		
Ten Mile brook.....				15,000				
Nine Mile brook.....					10,000	10,000		20,000
Quisibis River.....						25,000		
Siegas River.....						25,000		
Thibodeau brook.....								5,000
Trout brook.....							52,000	24,000
Unique Lake.....						34,000	12,000	
	1,610,000	713,000	134,715	206,000	20,000	597,160	140,000	288,345

Total distribution..... 3,709,220

MIRAMICHI HATCHERY

	Atlantic salmon			Speckled trout	
	Advanced Fry	Fingerlings		Fingerlings	
		No. 1	No. 2	No. 1	No. 2
Aboujagan River, upper.....				3,000	
Black River-Northumberland Co.....				4,500	1,500
Buctouche River.....				1,800	
Burnt Church River.....				4,000	
Caraquet River.....				5,000	
Cocagne River.....				1,800	
Grand Aldouane River.....				4,000	
Green brook-Bartibog River.....				5,000	2,000
Kouchibouguac River.....				1,800	2,200
McGinnis brook.....				1,800	
Little River-Nipisiguit Bay.....				2,500	
Little Southwest Miramichi River.....	648,000	140,800	11,205		
McKee Mills River.....				1,800	
Middle River.....		39,000			
Millstream-Nipisiguit Bay.....				2,500	
Nappan River.....				3,000	
Nigadu River.....				2,500	
Northwest Miramichi River.....	864,000	151,200	72,000		
Millstream.....	115,200	52,800			
Sevogle river.....		175,000			
Trout brook.....	28,800				
Pabineau Lake.....					3,000
Pokemouche River.....				5,000	
Richibucto River, Coal branch.....				1,800	
River des Caches.....				2,000	
Salmon River.....				1,800	6,600
St. Nicholas River.....				1,800	
Scoudouc River.....				3,000	
Southwest Miramichi River.....		156,000	36,000		
Barnaby River.....	115,200				
Burntland brook.....				4,000	
Cain River.....	230,400	100,800			
Long brook.....				4,000	
Renous River.....	115,200	100,800			
Dungarvon River.....	57,600	105,600			
Taxis River.....		20,000	54,000		
Tabusintac River.....	104,400		11,250		
Eskedelloe River.....				5,000	3,000
Tetagoche River.....		81,900			
Tracadie River.....				5,000	
Little Tracadie River.....				5,000	
	2,278,800	1,123,900	184,455	83,400	18,300

Total distribution..... 3,688,855

ST. JOHN HATCHERY

	Atlantic Salmon			Speckled Trout				
	Advanced Fry	Fingerlings		Fry	Advanced Fry	Fingerlings		Year-lings
		No. 1	No. 4			No. 1	No. 2	
Atlantic Biological Station, St. Andrews, New Brunswick.....						1,000		
<i>Albert Co.—</i>								
Little River.....						10,000		
Mechanic Lake.....						10,000		
Pollett River.....						10,000		
Prosser brook-Little River.....						5,000		
Stannard Lake.....				5,000				
Turtle creek-Petitcodiac River.....						10,000		
West River.....						10,000		
<i>Charlotte Co.—</i>								
Bartlett brook.....						10,000		
Bonaparte Lake.....							14,180	
Burns brook-Digdeguash River.....						10,000		
Clarence stream-Magaguadavic River.....					20,000			
Craig brook-Digdeguash River.....						10,000		
Deep Cove pond-Grand Manan island.....							2,500	
Digdeguash River.....					25,000	15,000		
Disappointment or Mistake Lake.....				20,000				
Doak brook-St. Croix River.....						10,000		
Eel Brook Lake-Grand Manan island.....		10,000						
Green Brown brook-Kanus River.....						10,000		
Half Moon Lake.....						8,000		
Lake Utopia.....						35,000	20,000	
Lake Retreat.....				20,000				
Leonard pond-Deer island.....								300
Lepreau River.....					10,000			
McDougall Lake.....						20,000		
McClary brook-St. Croix River.....						10,000		
Magaguadavic River.....	100,000	250,000	28,180					
Murchie brook-St. Croix River.....						10,000		
New River.....					10,000			
Red Rock Lake.....							5,000	350
Rois Lake.....								
St. Patrick Lake.....						10,000		
Scholar brook-South Oromocto Lake.....						8,000		
Stein Lake.....						10,000		
<i>Kings Co.—</i>								
Cassidy Lake.....						10,000		
Cedar camp stream-Trout creek.....						10,000		
Chisholm Lake.....							1,000	
Elm brook-Belleisle Bay.....						5,000		
Hammond River.....					15,000			
Jack Lake.....						5,000		
Joliff brook-Belleisle Bay.....						5,000		
Kennebecasis River.....		300,000						
Kennebecasis River, head-waters.....						10,000		
Kennebecasis River, south branch.....						20,000		
McGregor brook-Kennebecasis River.....						5,000		
Moss Glen Lake.....							4,000	
Pichette Lake.....						10,000		
Price brook.....						5,000		
Smith creek-Kennebecasis River.....						10,000		
Studholm brook or Millstream.....						10,000		
Trout creek-Kennebecasis River.....	100,000							
<i>Queens Co.—</i>								
Canaan River, north forks.....						5,000		
Lake stream waters-Salmon River.....					30,000			
Long Lake.....								280
Pleasant brook-Gaspereau River.....						10,000		
Salmon River.....	90,000							
<i>St. John Co.—</i>								
Blacks Lake-Moose creek.....						5,000		
Black Lake.....						10,000		
Boaz Lake.....						5,000		
Dolan Lake.....						5,000		
Elderly brook-Little River.....								150
Germain brook-Hammond River.....					10,000			
Graham Lake.....						5,000		

ST. JOHN HATCHERY—*Concluded*

	Atlantic Salmon			Speckled Trout				
	Advanced Fry	Fingerlings		Fry	Advanced Fry	Fingerlings		Yearlings
		No. 1	No. 4			No. 1	No. 2	
Grassy Lake.....						10,000		
Hanford brook.....						10,000		
Hanson River.....					5,000			
Henry Lake.....						15,000		
Hohey Lake.....						10,000		
Lily Lake-Rockwood park.....								200
Loch Lomond.....								300
Milligan Lake.....						20,000		
Mispek River.....								300
Musquash River, west branch.....						15,000		
Robinson Lake.....								180
Southern Lake.....						15,000		
Treadwell Lake.....						15,000		
Tyne Mouth creek.....	100,000	50,000						
<i>Sunbury Co.—</i>								
Oromocto River.....	100,000	75,000						
Otter brook.....						10,000		
Shin creek.....						10,000		
Three Tree creek.....						10,000		
<i>Westmorland Co.—</i>								
Anagance River.....						10,000		
Hayward brook-Anagance River.....						5,000		
North River.....						10,000		
Petitcodiac River.....		200,000						
<i>York Co.—</i>								
Davis brook-Magaguadavic River.....						10,000		
Lake George.....						30,000		
Lyon brook-Oromocto River.....						15,000		
Mink Lake.....						10,000		
Oliver brook-Magaguadavic River.....						5,000		
	490,000	885,000	28,180	45,000	125,000	617,000	46,680	2,060

Total distribution..... 2,238,920

PRINCE EDWARD ISLAND

CARDIGAN PONDS

	Rainbow trout Fingerlings		Speckled trout Fingerlings		
	No. 2	No. 3	No. 2	No. 3	No. 4
<i>Kings Co.—</i>					
Bear River.....				6,000	
Big brook-Fortune River.....			12,800		
Big pond.....					8,000
Brudenell River.....				6,000	240
Cardigan River.....					4,000
Coogan stream-Morell River.....					5,000
Crane's pond-Morell River.....				6,000	
Creed's pond-Sturgeon River.....				4,000	
Dingwell stream—Fortune River.....				4,000	
East or Hillsborough River.....			6,000		
Finlayson's pond-Greek river.....					4,000
Fitzpatrick's pond-Seal River.....					5,000
Fox River.....			2,500		
Larkin's pond-Naufrage River.....			9,000		
Mallard's pond-Souris River.....				4,000	
McAulay brook-Morell River.....					3,000
McCaskil River.....				3,000	
McDonald's pond-Fortune River.....			5,000		
McDonald's pond-North Lake.....				3,000	
McInnis' pond-Souris River.....				3,000	
McKinnon stream-Morell River.....					5,000
McLeod's pond-Midgell River.....			7,500		
McPherson's pond-Montague River.....				4,000	
McRae's pond-Montague River.....				4,000	
Midgell River.....				6,000	
Montague River.....				4,000	4,000
Mooney's pond-Morell River.....					5,000
Munn brook-Brudenell River.....					3,000
Naufrage River.....			9,000		
Poole's pond-Montague River.....					3,000
Priest pond.....				3,000	
Quigley's pond.....			7,500		
Sturgeon River.....				4,000	
Warren's pond-Head of East or Hillsborough River.....			6,000		
Webster's pond-Marie River.....					5,000
<i>Prince Co.—</i>					
Bain creek.....				4,000	
Barlow pond-Grand River.....					4,000
Bell's stream-Mill River.....				4,000	
Bell's stream (Cape Traverse).....					3,000
Brae River.....				4,000	
Cannon's pond-Smelt River.....				4,000	
Carr brook.....				3,000	
Clark's pond-Wilmot River.....					6,000
Conroy's pond.....				5,000	
Currie's pond-Little Pierre Jacques River.....				5,000	
Enmore River.....				5,000	
Gard's pond-Mill River.....			9,000		
Gordon's pond-Kildare River.....				5,000	
Green stream-Miminegash pond.....				5,000	
Harper's pond-Tignish River.....				6,000	
Haywood's pond-Tignish River.....				5,000	
Leard's pond-Trout river tributary to Lot 10 River.....				4,000	
Leard's pond-Tryon River.....					2,000
Marchbank's pond-Trout River (Tyne Valley).....				5,000	
McArthur's pond-Foxley River.....				3,000	
McAusland's pond-Mill River.....			9,000		
McKenzie's pond.....					4,000
McNally's pond-Jacques River.....					4,000
Myer's pond-Miminegash pond.....				5,000	
Rix's pond-Kildare River.....				5,000	
Round pond.....				5,000	
Scales pond.....				8,000	
Sheep River.....				5,000	
Tuplin's pond-Indian River.....					5,000

CARDIGAN PONDS—*Concluded*

	Rainbow trout Fingerlings		Speckled trout Fingerlings		
	No. 2	No. 3	No. 2	No. 3	No. 4
Webster's pond (Augustine Cove).....					3,000
Old Wool Mill pond-Tryon River.....					3,000
Wright Leard's pond-Dunk River.....					5,000
<i>Queens Co.—</i>					
Andrews' pond-East River.....				3,000	
Andrew's pond-Hunter River.....					3,000
Bagnall's pond-Hunter River.....			5,000		
Ballem stream.....					3,000
Beer's pond-Clyde River.....			6,000		
Belle River.....				6,000	
Black River-Covehead Bay.....					2,000
Black River-Tracadie Bay.....			6,000		
Brander's pond.....				4,000	
Callaghan's pond-Clark's stream.....				3,000	
Clark's stream-East River.....				6,000	
Coles pond-North River.....				6,000	
Cook's pond-Newton River.....				3,000	
Cousins pond.....				5,000	
Craswell's pond-Hunter River.....			5,000		
Dixon's pond-Sable River.....				6,000	
Found's pond.....				4,000	
Gates' pond-North River.....			3,000		
Glenfinnan Lake.....	24,000	28,000			
Hardy's pond-Winter River.....				6,000	
Hope River.....			9,000		
Johnstone's pond-Southwest River.....				3,000	
Lanes brook-Vernon River.....				3,000	
Leard's pond-Pisquid River.....					6,000
Leard's pond-Crapaud River.....					6,000
McAulay stream.....			6,000		
McLeod's pond-Murray River.....			7,500		
McPherson's pond-Flat River.....				6,000	
McPherson's pond-Pinette River.....				6,000	
Parson's pond-Glynde River.....				6,000	
Pisquid or O'Keefes Lake.....	9,000	27,300			
Rackham's pond-Wheatley River.....				6,000	
Scott's pond-Clyde River.....			6,000		
Simpson's pond-Hope River.....					6,000
Southwest River.....				6,000	
Stevenson's pond.....				4,000	
Stordy's pond-Crapaud River.....				6,000	
Watt's stream-Winter River.....					6,000
West River.....					9,000
Winter River.....				8,000	
Wisner's pond-Clark's stream.....				1,000	
	33,000	55,300	136,800	266,000	134,240

Total distribution..... 625,340

PRINCE EDWARD ISLAND—*Concluded*

KELLY'S POND HATCHERY

	Atlantic salmon		Speckled trout		
	Fry	Advanced fry	Fry	Fingerlings	
				No. 1	No. 2
<i>Kings Co.—</i>					
Big pond.....				12,800	
Coogan stream-Morell River.....				10,600	
Goose River.....				8,400	
Hay River.....				8,400	
McRae's pond-Montague River.....				8,400	
McKinnon stream-Morell River.....				10,200	
Montague Electric pond.....				8,400	
Morell River.....	195,000	208,900			
North Lake.....				12,800	
<i>Prince Co.—</i>					
Beaton brook-Mill River.....				8,000	
Barbara Weit River.....				5,898	
Doyle stream-Mill River.....				8,000	
Dunk River.....	130,000	190,000			
Kane's stream.....				8,000	
Hayes pond-Dock River.....			2,000		
Big Pierre Jacques River.....				8,000	
Scales pond-Dunk River.....				8,000	
Tuplin's pond-Indian River.....				8,750	
<i>Queens Co.—</i>					
DeSable River.....				10,200	
Fanning brook-East River.....				10,557	
Hardy's pond-Winter River.....				10,100	
McLean Brothers pond-West River.....					4,210
McLean's pond-Gurney stream.....					3,900
McLeod's pond-Murray River.....				10,100	
McMillan's pond-Vernon River.....				10,500	
Parson's pond-Glynde River.....				10,500	
Rackham's pond-Wheatley River.....				10,200	
Scott's pond-DeSable River.....				10,600	
Vessey brook-Winter River.....				10,200	
West River.....					3,900
Winter River.....				12,000	
	325,000	398,900	2,000	239,605	12,010

Total distribution..... 977,515

BRITISH COLUMBIA

ANDERSON LAKE HATCHERY

	Sockeye salmon
Hillier creek—Maggie Lake	Eyed eggs
	1,030,830
Total distribution	1,030,830

APPENDIX No. 3

ENGINEERING BRANCH

REPORT BY CHARLES BRUCE, A.M.E.I.C., CHIEF ENGINEER

All works of a technical nature undertaken by the department in the Maritime Provinces, British Columbia and the Northwest Territories, where the fisheries are administered by the federal government, come under the responsibility of the Engineering Branch. It is also responsible for the design of fishways which may be prescribed, under the provisions of the Fisheries Act, for privately owned dams, for the administration of the department's oyster cultural policy in the Maritime Provinces and for the design and supervision of construction of bait freezers and cold storage plants in instances where a subsidy towards the cost is paid by the department. The services of the branch are also available to the Fisheries Research Board and, where such action is requested, it assists and co-operates with fish and game associations in the establishment by them of rearing ponds, stream improvement and other works.

The work of the branch in British Columbia is under the direct supervision of Resident Engineer John McHugh, with headquarters at Vancouver, B.C.

BUILDING FISHWAYS AND CLEARING RIVERS

Works under this heading involve,— (a) surveys and the preparation of designs for the installation of adequate fishways either in dams built across rivers frequented by fish or to overcome natural falls or impassable barriers to their ascent and (b) the removal of obstructions to the ascent of fish, which have accumulated as a result of land slides, forest rubbish carried down stream during freshets, large trees which have fallen across streams as a result of undermining of the banks during freshets and in some instances materials either placed or carried into the streams as a result of logging operations. Through the activity of the local inspectors and fishery guardians, logging operations are, in general, being undertaken with greater care where they are located in areas drained by streams frequented by fish, as the operators have been brought to realize that it is less expensive to arrange from the commencement of operations that the streams be kept clean of fallen material and culled logs than to be required to return afterwards and clear up debris. In spite of this improvement, however, jams composed of materials washed down from river banks during freshets and windfalls will continue to form in stream beds, but, if their removal is undertaken without undue delay, heavy expenditure in individual cases may not be required.

Discontinuance of artificial fish cultural work for the propagation of salmon in Pacific Coast waters has resulted in attention being focussed more than ever on the preservation, improvement and development of natural spawning grounds which lie in the great numbers of streams draining the British Columbia coastline and are in many instances difficult of access. Before any improvement of conditions for the ascent of fish past natural barriers is undertaken, with the view to an extension of spawning areas, it is necessary to explore the stream above the barriers to determine whether suitable gravel beds exist of sufficient extent to give promise that the returns will be commensurate with contemplated improvements.

Unless obstructions are of a major character, such as to require the advice of an engineer, it is the usual practice to require their removal under the supervision of the local fisheries inspector, after the need has been established.

The works undertaken during the year are classified and reviewed hereunder.

NOVA SCOTIA

Jordan River, Shelburne County.—The bed of the river was channelled at several points where freshets had formed gravel bars which were preventing the ascent of salmon.

Medway River, Queens County.—Extensive repairs were completed to the approach to the fishway in the dam at Charleston, where heavy ice had partially demolished the concrete walls, during the previous winter. An inspection of the dam at South Brookfield was made to obtain further data with regard to a proposed fishway.

Tusket River, Yarmouth County.—Following the decision that a fishway should be required in the storage dam on this river at Reynardton, information was procured from which a design for the structure was prepared and furnished to the Nova Scotia Power Commission, owners of the dam.

Petite Riviere, Lunenburg County.—During the year the town of Bridge-water proceeded with a hydro-electric development on this river and, after the necessary surveys had been made, a design for a fishway for the dam was prepared and furnished to the town authorities.

LaHave River, Lunenburg County.—Work of repairing the fishway in the dam at Wentzell's lake was completed and an inspection and survey were conducted at the lower end of this river, where it had been represented work should be done to improve conditions for the ascent of salmon. The conclusion was that during low water conditions, for which the work was proposed, the situation would not be much improved unless additional water was available, and accordingly no work was undertaken.

Gaspereau River, Kings County.—Further consideration was given to the matter of screening the diversion canal from Gaspereau lake and alternative proposals were submitted to the Nova Scotia Light and Power Company which operates hydro-electric developments on the river. Due to changes in water conditions at the outlet of Gaspereau lake, resulting from increased use of the storage water through the diversion canal, it was necessary to consider requiring the company to make modifications to the means for the ascent of fish past the storage dam at that point. Surveys were made and designs for a new fishway completed and supplied to the company. Information was also obtained regarding the proposal that screens should be installed at the intakes of the power development on this river at Whiterock, to prevent descending gaspereau from passing through the turbines.

Ostrea Lake, Halifax County.—Following the receipt of representations from the local fishermen that the channel from the sea to this lake, known as Rocky Run, should be improved in order to facilitate the movement of fishing boats into and out of the lake, an inspection and survey of the situation was made. As the matter was one relating to the navigation of boats, the information was referred to the Public Works Department for action.

East River Sheet Harbour, Halifax County.—An instrumental survey was made to procure information with regard to representations that a fishway should be provided at the easterly end of the hydro-electric development dam at Ruth falls. The dam is provided with a fishway at the westerly end. Owing to un-

favourable conditions for salmon on this river, due to almost complete development of power at this and other points, no decision to make any change in the existing provision for the ascent of fish at this point was reached.

Gunn's Brook, Guysboro County.—Representations having been received that erosion of a high gravel bank along this stream was interfering with the ascent of fish, an inspection was made to secure information as to what would be involved. This showed that, while erosion had taken place, it was not in any way harmful to the fisheries and accordingly no work was undertaken.

Catalone Lake, Cape Breton County.—Following the receipt of reports that the channel between this lake and the sea had become so shallowed that sea trout were prevented from entering, an inspection of the situation was made. This is a situation where the action of the sea is constantly advancing the beach and tending to reduce the depth of the channel from the lake. However, as the entrance itself is tidal and provides ample depth for fish to enter during high tide periods, it was not considered necessary to do any work.

Georges Brook, Inverness County.—An instrumental survey was conducted, following which a stone-filled cribwork 110 feet long and 6 feet high was built along the right bank of this brook immediately below the road bridge to arrest erosion of the bank at that point.

Margaree River, Inverness County.—As representations had been received that diversion of the Southwest Margaree River, resulting from freshets cutting new channels at a location known as McLennan's meadows, was interfering with the ascent of salmon, an inspection of the situation was made. It was found that, while the river had become divided into two channels, the main one was still carrying ample water for the free movement of fish and accordingly no work was undertaken.

In addition to the foregoing, inspections were made of the following:—Fishway at Hubley's dam on the Osier River, dam at Millers Lake on the Salmon River, Guysboro County, and the fishway at No. 6 development on the Mersey River. At this latter place the question of suitable regulation of water over the various spillways of the dam to prevent salmon from becoming "pocketed" in isolated channels was looked into and arrangements made with the Nova Scotia Power Commission to prevent this.

NEW BRUNSWICK

Magaguadavic River, Charlotte County.—During the previous winter some damage was caused to the concrete walls of the fishway at St. George and repairs were effected. The fishway in the dam in this river at Flume ridge was seriously damaged and had to be practically rebuilt.

Nashwaak River, York County.—Several of the concrete blocks which were placed on the floor of a gateway in the dam at Marysville several years ago to improve conditions for the ascent of salmon were replaced after they had been damaged by ice during the preceding winter.

Aroostook River, Victoria County.—Officials of the State of Maine Game and Fisheries department having requested that they be given advice regarding improvements to the facilities for getting salmon past the power dam on this river, an engineer of the department attended a conference at which the situation was discussed. As the State of Maine fisheries would benefit directly by having salmon ascend the river, any work would be undertaken by the authorities of the state, notwithstanding that the dam is on the Canadian side of the border.

BRITISH COLUMBIA

Atnarko River.—An accumulation of river drift, which, if allowed to remain, would block off valuable sockeye spawning grounds, was removed.

Beljay Creek, Queen Charlotte Islands.—Three obstructions of roots, logs and river drift were removed.

Big Qualicum River.—A log jam located at the confluence of this stream with Hunt creek was removed, providing access to four additional miles of spawning grounds in the latter stream.

Brunette River.—In collaboration with officers of the British Columbia Game Commission, conditions in this stream were investigated with a view to assisting the entry of sporting fish into Burnaby Lake. So many factors enter into the situation that no satisfactory solution of the problem has yet been reached. Further consideration of the problems may be undertaken by the officials of the Vancouver District Sewerage and Drainage Board, which controls the discharge from the lake, and the services of an engineer of the department will be available.

Cooks Creek, Vancouver Island.—Two impassable jams of logs and debris were removed.

Captains Cove.—A passageway ten feet wide, four feet deep and seventy-five feet long was cut through a log jam at the head of this stream, thus enabling a good run of sockeye to pass through to spawning grounds in the lakes above.

Coquihalla River.—A portion of the bed of this river in the vicinity of Hope was inspected to report on the alleged loss of spawning grounds as a result of stream changes. As the new channels are in gravel formation, they possibly presented equal value with the old as spawning grounds. No obstruction to the ascent of fish was involved.

Cowichan River.—An inspection was made in company with engineers of the federal and provincial Public Works Departments of the section of this river from the town of Duncan to its outlet at Cowichan Bay, with reference to proposed joint action by the various departments concerned towards restoration of the original channel. From the viewpoint of the fisheries, it would appear that logging of the upper watershed has so affected the runoff that salmon are delayed in entering the river and, while log jams exist, the local fishery officers are definitely of the opinion that no obstruction to their ascent exists, as they eventually proceed upstream when water conditions become suitable. In the circumstances, no action by the Fisheries department is contemplated.

Jickling Creek, King Island.—A survey of the bed of this stream which drains four lakes was made and three separate falls, fifteen, forty and ten feet high respectively, with fast water between, were inspected. The first requirement would be artificial seeding of the area to create a run of salmon and fish-ways would be required through the various falls. A careful instrumental survey would be required to provide data from which to estimate the probable cost of this construction.

Kimsquit Lake.—A log jam at the foot of this lake reported to be holding up the level of the water and thus impairing the utility of limited spawning grounds was inspected. No action to remove the jam is contemplated at the present time.

Little Qualicum River.—An inspection was made of log jams and spawning grounds from Little Qualicum falls downstream. There are several large log

jams in this stream which do not obstruct the passage of salmon and minor works have been performed in recent years, sufficient to keep the stream open. The stream flows generally through logged-off land and in freshet time carries a heavy flow which erodes the banks and releases additional debris to add to the accumulations already present. Constant vigilance and remedial work from time to time are necessary to keep the stream open.

Lowe Inlet.—An inspection of spawning grounds and obstructions in this area was made and plans, with the estimated cost of remedial works, prepared.

Nelson Creek, Burrard Inlet.—A large boulder which obstructed the passage of salmon was removed.

Port Stephen.—A log jam which prevented the ascent of salmon was removed.

Powrico Bay, Q.C.I.—A fair sized log jam at a point approximately one-quarter of a mile from the mouth of the stream together with other debris stretching over one mile of stream bed were removed.

Red Bluff Creek, Grenville Channel.—A general survey of this creek which drains a lake of the same name was made. A fall twenty-five feet high is an effectual barrier against the entrance of salmon. The lower reaches of the stream are at present used by a light run of chum salmon for spawning. Owing to the difficult situation, no work looking to making the fall passable for salmon is contemplated at the present time.

Sagar Lake, King Island.—This stream is obstructed to the passage of salmon by a vertical fall twenty-five feet high. As it flows from a lake on the shores of which there are areas suitable for spawning grounds, the local inspector had recommended that consideration be given to making the falls passable for salmon. The cost of constructing an efficient fishway would be so high that no work is contemplated.

Salmon Bay Creek, Matheson Channel.—A log jam lying completely across the bed of the stream and backed by heavy gravel and boulders, which definitely blocked the ascent of salmon, was removed.

Sedgewick Bay Creek, Q.C.I.—A channel ten feet wide was cut through a log jam near the mouth of the stream.

Skutz Falls, Cowichan River.—The fishway through these falls, reported to be in need of repairs, was examined and it was found that certain cross walls had become partially undermined at their bases through the action of boulders churning around in the pools. The river was too high to execute the necessary repairs and it will be necessary to do the work at some future time.

Thurston Harbour Creek, Q.C.I.—A channel thirty feet long was cut around the end of a log jam, permitting salmon to pass upstream.

Whonnock Creek.—Logs and debris in five separate locations in this stream between the lake and the outlet were removed thus affording an unobstructed passage for salmon to the spawning grounds.

Yakoun River.—Logs and roots which threatened to form an impassable obstruction were removed. This river is subject to heavy freshets and its upper course lies in country carrying a dense growth of large spruce timber. Whole trees at times are carried into the stream bed as the banks are eroded by the freshets, creating conditions which are continually requiring attention.

FISH CULTURAL ESTABLISHMENTS

In addition to the usual repairs and upkeep of the various hatchery establishments, the following works were undertaken:—

NOVA SCOTIA

Bedford Hatchery.—On proceeding with improvements to the highway which passes this hatchery, the Provincial Road Department advised that the lower end of the canal leading from the Sackville River, from which the water mains to the hatchery are taken off, encroached considerably on the road allowance. A survey revealed that this was correct and it was necessary to build new concrete headworks to overcome this encroachment.

Grand Lake Ponds.—Ten new ponds, each measuring 96 feet long, 4 feet wide and $1\frac{1}{2}$ to 2 feet deep, and one pond, 96 feet long, 10 feet wide and $3\frac{1}{2}$ to 4 feet deep, were built during the year. The work included extension of the water supply, sluice and drainage facilities. The ponds, excavated with sloped sides and bottoms, were not specially treated.

Nictaux Sub-hatchery.—As difficulty was experienced with ice in the supply pipe to this hatchery at the inlet into the power canal, a new 6-inch wood stave pipe was laid from the main gate in the dam with the requisite cribwork to provide support and protection against damage.

Stevens Brook Ponds.—The headworks of this pond system which were of wooden construction had become leaky through long use and it was necessary to rebuild them. Reinforced concrete was used in the new work and it was also necessary to reline and repair a concrete road culvert to which the headworks connect, as leaks and consequent loss of water had developed.

Kejimikujik Ponds.—A bungalow measuring 21 feet by 28 feet 3 inches was built for the superintendent. The building provides a living room, two bedrooms and a kitchen with a small pantry and cellar. A well for domestic water supply was completed and a pump operating with a small gasoline engine was installed. Provision was made as well for a hose connection for washing the feed room floor in the cold storage building.

An engineer attended sittings of the Exchequer Court to give evidence in connection with the expropriation of lands required for flowage around Grafton Lake from which the water supply for the ponds of this establishment is secured.

Antigonish Hatchery.—A sub-hatchery measuring 28 feet 6 inches by 72 feet 3 inches was built on the hatchery property to accommodate the increased output of eggs and fry. The twenty-one hatching troughs with which it is equipped each measure 20 feet long, 21 inches wide and 10 inches deep, these dimensions being adopted instead of the usual standard to admit of making use of the troughs, after hatching occurs, for holding fry to a more advanced stage. The water supply involved only a short section of 8-inch pipe from one of the existing 20-inch mains.

In order to provide facilities for holding food for the fish reared at this establishment, a small cold storage plant was completed during the year. The building measures 20 feet 3 inches by 25 feet and affords a cold storage room with a capacity of about ten tons, ante-room, engine room and feed room. Refrigerating machinery capable of providing a temperature of zero in the cold storage room was installed.

Electricity, which became available during the year, was installed in all the hatchery buildings and the lighting plant, previously used for this purpose, was removed

As a result of the installation of a small dam at the outlet of Lake Katrine to provide some storage for hatchery purposes, the owners of lands at the head of the lake alleged that some damage was done to their meadow lands by the flowage. A survey of this situation was completed and the acreage of the meadows determined as a basis for settlement of claims for damage.

A concrete retaining wall 110 feet long was built, fronting the hatchery building, along the bank of the South River. This replaces the original cribwork which had rotted beyond repair.

Cobequid Hatchery.—A system of thirty-two rearing troughs with the requisite head trough, drains and water supply, from the 14-inch main, was built on the hatchery property. Electricity having become available, it was installed for the lighting of all hatchery buildings and the lighting plant previously used for this purpose was transferred to the Lindloff hatchery.

Lindloff Hatchery.—In order to remove a fire hazard, it was decided to acquire a small piece of wooded land near the hatchery building. Surveys of this land were made and the deed transferring it to the Crown was completed. Also, an additional area of land to afford more space back of the new hatchery dwelling was obtained by grant from the Government of Nova Scotia. The lighting plant transferred from the Cobequid hatchery was installed.

Mersey River Rearing Ponds.—As reasonably favourable results had been obtained during the previous year in the use of one of the large pools in the fishway at No. 3 power development on the Mersey River, it was decided to utilize more of the fishway. After a survey of the situation, the utilization of three sections was decided on and pipe lines, screens and the necessary drainage facilities were installed. A cabin for the superintendent was built and, as there is no road to the pond site, a cableway was erected across the canal from the power development to facilitate the handling of materials and supplies.

Middleton Hatchery.—The stream from which the water supply for this hatchery is obtained is fed entirely from spring sources which have in recent years gradually dwindled in volume to a point where there was not sufficient to operate, especially during the dry periods. Consideration was given to a means of increasing the supply, but no source was available except from a well. It was hoped that, due to the generally springy nature of the land, a reasonable quantity of water might be obtained by drilling a relatively shallow well, but it was necessary to go down to a depth of 450 feet to obtain a supply of 40 gallons per minute. The well is fitted with a deep well turbine pump operated by an electric motor.

Yarmouth Hatchery.—Electric power lines having been extended to supply the district, power was installed in the hatchery buildings for lighting and operation of other appliances. The lighting plant, previously used for the purpose, was removed. Inspection was made and estimates prepared for general repairs to the buildings and ponds.

Inspections and Surveys.—Preliminary surveys, to assess the suitability of proposed sites for rearing pond systems, were made at Barne's brook, Doran's brook, North Mountain Lakes and French Mill brook. The dam holding water in the Wittenburg experimental pond, the gate of which is in a poor state of repair, was inspected and a means of carrying on the operations with the minimum of expense reported on. A general inspection was made at the Coldbrook rearing pond station.

NEW BRUNSWICK

Charlo Hatchery.—Following preliminary work during the previous year, sixteen circular ponds each twenty-five feet in diameter were constructed, including connections to the water supply and drains. As the soil at this location is not impervious, it was necessary to place clay linings in the ponds over which gravel and sand was laid to provide a suitable surface.

The drainage from the circular pond system was carried to disposal in a ditch excavated for the purpose and, as it was desirable to provide a large pond for retaining parent fish throughout the winter, this ditch was excavated to form such a pond having a length of 160 feet, a width of 20 feet at the water line and a depth varying from 5 feet at the upper end to 7 feet at the lower end. A dam and screens were installed at the lower end. The pond may be divided 80 feet from the upper end by screening between the abutments of a road bridge, which was built spanning it at that point.

Considerable work was done in grading the hatchery grounds and gravelling the drives and walks and wire fencing was erected around the property.

Miramichi Hatchery.—An inspection was made of damage to the cribwork of the salmon retaining pond and estimates of costs prepared. A verandah 8 feet by 20 feet was built across the front of the dwelling replacing a small porch.

New Mills Pond.—A general inspection was made and estimates of the cost of repairs to the building prepared.

Saint John Hatchery.—The facilities in the way of an icehouse and feed room as well as in garage space for the hatchery truck having become inadequate, it was decided to demolish the building in which they were provided and erect a new one. As storage space was also lacking, and as no work room was available, the new building was designed to provide these facilities as well. The building, measuring 22 feet by 52 feet 8 inches, was erected by contract during the year.

St. André, Madawaska County.—A detailed survey of a site on a small stream at this place was made for the purpose of determining its suitability for the establishment of a pond for holding trout. A plan and estimate of the cost of building the dam and other necessary works were subsequently prepared, but it was decided not to proceed at that time.

PRINCE EDWARD ISLAND

Charlottetown Hatchery.—An inspection of the dam at this hatchery was made in connection with repairs to the sluiceway, the work on which was subsequently completed.

Cardigan Ponds.—An inspection for the purpose of determining the feasibility of installing outside troughs below the water supply dam was made.

OYSTER LEASING

Leasing of ground for oyster farming was continued during the year 1939 both in Prince Edward Island and Nova Scotia.

In Prince Edward Island a total of 146 leases were completed. While a total of 735 leases had been issued since leasing started, 133 had been cancelled either voluntarily or due to the lessee having failed to pay the rental, thus leaving 602 leases, having a combined area of 1,713 acres, in effect at the end of the year. In addition, there were 973 applications before the department for consideration. Action on an application, before it is approved, includes investigation of the area it covers in order that the applicant may be advised of the

prospects before he makes any investment. Following approval, the area is surveyed and a proper description obtained for inclusion in the lease. Surveys can be undertaken, in many instances, only during fine and reasonably calm weather in summer and during fine weather in winter.

In Nova Scotia 47 leases were issued during the year, making a total of 67 having a combined area of 166 acres in effect at the end of the year, while 168 applications were receiving consideration.

As the need for accurate charts of certain inlets in Prince Edward Island had arisen in connection with the correct location of areas for leases, it was decided to concentrate on surveys of these inlets and leave the location of areas for which applications for leases had been received until the winter when this could be done on the ice. It was, however, found desirable to locate certain areas at places which could not be reached very readily in winter due to road conditions. These included areas in Murray harbour and Cascumpeque bay, including Kildare river. During the year 58 areas were surveyed and re-surveys of 14 old areas were completed. A complete triangulation and stadia survey of Conway narrows was made and charts for the location of areas for leasing were completed. A triangulation survey and part of a stadia survey of Enmore and Percival rivers was undertaken and will be completed in the coming year. In addition all picking areas in Bideford River were re-surveyed.

In Nova Scotia the work concentrated on surveys for leases, a total of 85 new areas and re-surveys of 13 old provincial leases being completed.

A survey of additional land required by the department for oyster cultural purposes at Malagash was completed and the necessary description for the preparation of the deed prepared.

As no accurate charts on a scale large enough for use in properly locating leases in the Bras d'Or Lakes are available, it was decided to make surveys from which these could be prepared. A start was made on this work at River Denys basin.

A detailed report of oyster cultural work under the department will be found in Appendix No. 4.

MISCELLANEOUS

Cold Storage Plants.—The cold storage plant at Half Island Cove, N.S., the conversion of which from an ice and salt to a mechanical refrigeration system was subsidized during the previous year, was completed in 1939. The plant has a daily freezing capacity of 18,000 pounds and a storage capacity of 250,000 pounds. The agreement with R. Hendsbee and Company provides that the company shall buy all the fish offered by Chedabucto Bay fishermen and others who may bring their fish to the plant and that the company shall keep on hand an adequate supply of bait to meet all local requirements.

During the year an agreement was entered into with Matthews and Scott Company, Limited, Queensport, N.S., under which the department subsidized the conversion of a cold storage plant equipped with ice and salt refrigeration to a mechanical refrigeration system, including improved insulation and structural changes to the buildings. The freezing and holding capacities are the same as those in the R. Hendsbee and Company plant and the company is required to comply with the same conditions as regards the purchase of fish and supplying of bait to the fishermen.

An agreement was entered into with R. E. Jamieson, Limited, under which the department subsidized the erection of a cold storage plant and wharf in connection therewith at Canso, N.S. The plant, which is equipped with mechanical refrigeration has a daily freezing capacity of 30,000 pounds and a storage capacity of 600,000 pounds, of which 100,000 pounds is available to co-operative groups of fishermen at rates for freezing and storage that are

at the time prevailing at commercial cold storage plants in the province. The company is also required to keep 2,400 cubic feet of refrigerated space available to fishermen for storage of baited trawls at prevailing commercial rates. The company is required to buy all fish offered at the plant by the Canso and other shore fishermen and to keep in cold storage an adequate supply of bait to meet all local requirements.

Under the provisions of the Bait Freezer Regulations a subsidy was paid in the erection of a bait freezer at Park Corner, Queens County, P.E.I. This plant, having a freezing capacity of 10,000 pounds daily and a holding capacity of 96,000 pounds, is owned by Mr. John E. Cousins. It is used for the freezing and storing of bait only.

An engineer, in company with the Supervisor of Fisheries, interviewed co-operative groups of fishermen at Port Bickerton, Drum Head, New Harbour, Larrys River and Port Felix, all in Guysboro County, N.S., with a view to securing information regarding the needs, in each instance, of ice and cold storage facilities in connection with the fishing operations of the groups.

Wharf at Canso, N.S.—Following the decision that the department would repair the wharf owned by the Eastern Co-operative Fisheries, Limited, at Canso, a survey was conducted to determine the best means of proceeding. The wharf was a crib structure 20 feet wide and 92 feet long, the topping of which was in a poor state of repair. The fishermen's association was finding this accommodation too small for its requirements and urged that an extension of cribwork be made to increase the wharf area. Enquiry revealed that, unless creosoted timber was used, cribwork would not prove very permanent, as untreated wood is subject to attack by the ship worm (teredo). It was accordingly decided to enlarge the wharf to 50 feet in width and 122 feet in length, using creosoted pile construction with close piling around the sides and outer end to break the seas. After plans and specifications had been prepared, the work was completed by contract.

Salmon River, Digby Co., N.S.—An inspection was made in connection with the suggestion that old dams should be rebuilt on the upper waters of this river to provide controlled flowage in the lower reaches as a means of improving the salmon runs. The effects of controlled flow are now under investigation by the Fisheries Research Board, and no action other than to secure information regarding the possibilities was contemplated in the inspection of the Salmon River.

Seining Area 17—Fraser River.—The boundaries of this area having been revised, it became necessary to establish the northern boundary by means of two pile driven beacons on the sandheads to the eastward of the area, for the assistance of fishermen and departmental officers. Plans and specifications were prepared and tenders for the work, which consisted of furnishing and driving six, sixty to seventy foot piles in two clusters of three at widely separated points, each surmounted by a triangular wooden sign painted in orange and carrying the words "Fishing Boundary" in black letters, were requested. The contract was awarded and the work completed before the fishing season opened.

Sloan Commission Enquiry.—For use in connection with this enquiry, maps were prepared showing: (1) Location of fishing area 17 near the mouth of the Fraser River and surrounding waters; (2) Locations of the various trap sites in vicinity of Sooke; (3) Plans showing details of salmon trap construction; (4) Plan showing details of former trap locations in Puget Sound waters.

Inspections of Streams.—An opportunity was taken whilst an engineer was in the vicinity of Bella Bella to inspect certain streams which, in the opinion of the local inspectors, afforded possibilities for the use of potential spawning areas at present inaccessible because of impassable falls.

Marine Ways and Warehouse, New Westminster.—This work, preparation for which was made in consultation with this branch, was completed during the year under the supervision of the Public Works Department, New Westminster.

Fisheries Office, Schooner Passage, Rivers Inlet.—A new sidewalk was completed at this station under supervision of the Public Works Department, New Westminster.

General.—Correspondence in connection with this branch of the service and work in connection with plans and specifications of work done by the department were prepared, district maps were brought up to date and sketches prepared as required in connection with licence areas or to illustrate departmental correspondence.

APPENDIX No. 4

**REPORT ON OYSTER CULTURE WORK UNDER THE DEPARTMENT
OF FISHERIES FOR THE YEAR 1939-40**

BY A. W. H. NEEDLER, FISHERIES RESEARCH BOARD

In the fiscal year 1939-40 oyster culture work was carried on by the Department of Fisheries in Prince Edward Island and Nova Scotia. Work under the present program has been in progress in Prince Edward Island since 1928. In Nova Scotia some preliminary investigations were commenced in 1934 but intensive work was not started until 1936. In New Brunswick investigations were carried on in the Shediac area in 1932 and 1933 but development was postponed on account of uncertainties in the situation regarding public health control and will now be resumed.

The Dominion Government by an agreement with the province of Prince Edward Island in 1928 obtained jurisdiction over the province's oyster areas and undertook to develop its oyster industry. As the most important step in that direction the establishment of oyster farming was planned in those suitable areas which did not support a public fishery. Experimental oyster farming was commenced by the department in 1928 and scientific investigations by the Fisheries Research Board (then the Biological Board of Canada) in 1929, and these have been continued in close co-operation. The leasing of oyster ground was started in 1931 and development of oyster farming has been rapid, especially in the Malpeque bay region. For a more detailed review of the earlier course of the program reference may be made to appendices of earlier annual reports of the department.

In 1936 the Dominion Government entered into an agreement with the Province of Nova Scotia similar to that made with Prince Edward Island in 1928. Jurisdiction over the oyster areas of the province was transferred to the Dominion which undertook development of the industry. Intensive investigations of the conditions for oyster culture were commenced in 1936 in the two important regions—the Bras d'Or lakes of Cape Breton and the gulf of St. Lawrence coast of the mainland. Ground was first offered for lease in February, 1938, and development of oyster farming has now commenced on a small scale.

In New Brunswick jurisdiction over Shediac bay alone was transferred to the Dominion Government in 1931. Conditions for oyster culture were investigated in 1932 and 1933 and development has been hindered by uncertainty regarding the public health situation. Further investigations on oyster production and purification there are now planned.

The greatest development of oyster farming has been in the Malpeque Bay region and investigations and experimental farming in co-operation with the Fisheries Research Board have centred at the Prince Edward Island Biological Station at Ellerslie. General headquarters for the work as a whole have been maintained there and much of the information and experience gained in Prince Edward Island is applicable in Nova Scotia. Intensive work is in progress in

the Bras d'Or lakes near Orangedale and on the Northumberland Strait coast at Wallace and Malagash to study the special problems of those regions. While the work is, for convenience, reported below separately for the two provinces, it is made one by the common planning and by the use of personnel and other resources in common.

While the general prospects for the oyster farming industry are good it must be remembered that it is still in an early stage of development. There has been a great increase in the effort to grow oysters and a corresponding increase in the yield. Even in the Malpeque Bay region, however, where the development started first, more money is being spent than is being received for the oysters sold. The industry can hardly be considered to have reached maturity until the total receipts exceed the total expenditures. With increasing production marketing is becoming more important. The final establishment of a stable industry depends on the continued development of economical methods of culture and of adequate markets and marketing methods.

The outbreak of war in September, 1939, has not yet affected the fundamental prospects of oyster culture in the Maritime provinces. The Canadian production is still far below the consumption and in the autumn of 1939 the demand remained good and prices approximately the same as in the previous year. The war has affected interest in oyster culture to some extent and availability of funds for private investment, through change in occupation or in the financial circumstances of those engaged in the industry. The uncertainty also affected marketing to some extent in the early part of the 1939 season. The further effects of the war remain to be seen but when this report was prepared there was no definite prospect of the industry being seriously affected in any permanent way.

A. PRINCE EDWARD ISLAND

In 1939-40 oyster farming was carried on in Prince Edward Island on about the same scale as in the previous year. It was still centred largely in the Malpeque-Cascumpeque area. During the year further progress was made in the development of methods of production. The oyster mortality in the Charlottetown region had completely destroyed the public fishery there by the summer of 1939. There is now, however, further evidence of the resistance of Malpeque stock to the disease causing the mortality and an effort is being made to use Malpeque oysters for re-establishing the industry in that region where there is a growing interest in oyster farming. The grading which has been developed in the past few years was used to a greater extent in 1939 and is gradually providing a sound basis for organized marketing. These and other aspects of the development in 1939-40 are reported in greater detail below.

Development of Leased Areas:—Table 1 which follows summarizes the development of oyster farming in Prince Edward Island in 1939. It is compiled from individual statements obtained from all oyster farmers and while complete returns are not always obtainable and the figures are, therefore, sometimes less than the truth it gives a reliable conservative approximation. The table shows that there has been no increase in the total oyster farming activity but that it has been maintained at about the same level in 1939 as in 1938. A number of factors are responsible.

The mortality of oysters in the Charlottetown region has hindered the development in the eastern part of the province. Although interest in oyster farming is increasing the effect is not yet shown in 1939. A similar mortality

TABLE I.—SUMMARIZING THE DEVELOPMENT OF AREAS UNDER CULTIVATION IN PRINCE EDWARD ISLAND TO 1939

Region	Year	Number of Areas under Cultivation	Approximate Total Area	Oysters Planted	Oysters sold	Shells used for Spat Collection	Card-board Spat Collectors used
			(acres)	(bbl.)	(bbl.)		
Malpeque-Cascumpeque, including Darnley and New London bays.	1932	26	110	254	0	1,500	0
	1933	47	203	935	181	1,600	0
	1934	85	388	1,516	434	1,050	1,254
	1935	101	453	1,303	979	645	3,350
	1936	202	862	3,342	1,093	1,000	13,600
	1937	336	1,314	3,192	1,948	25,000	55,600
	1938	457	1,729	5,968	3,451	3,000	98,000
	1939	495	1,913	5,646	3,224	300	70,700
Rustico to Savage bays.....	1933	9	41	428	50	400	0
	1934	13	63	595	92	2,650	0
	1935	26	117	750	145	4,300	0
	1936	29	128	38	1	930	440
	1937	31	137	21	0	25	0
	1938	31	137	15	0	38	0
	1939	31	137	20	0	160	0
North Lake to Pinette River...	1935	11	16	136	0	Some	0
	1936	12	18	53	3	Some	0
	1937	16	30	22	0	25	0
	1938	22	50	46	61	4	0
	1939	27	63	21	0	0	0
Bedeque Bay.....	1937	65	179	1,934	0	0	0
	1938	69	184	3,594	788	0	0
	1939	77	204	1,142	582	20	650
Brae Harbour and Wolfe Inlet..	1937	15	30	6	0	0	0
	1938	15	30	4	0	0	0
	1939	15	30	6	0	0	0
Total.....	1932	26	110	254	0	1,500	0
	1933	56	244	1,363	231	2,000	0
	1934	98	451	2,111	526	3,700	1,250
	1935	138	586	2,189	1,124	5,000	3,350
	1936	243	1,008	3,433	1,097	1,900	14,040
	1937	463	1,660	5,175	1,948	25,000	55,600
	1938	594	2,130	9,627	4,300	3,042	98,000
	1939	645	2,347	6,835	3,806	480	71,350

occurred in the Malpeque-Cascumpeque region about twenty to twenty-five years ago and apparently occurred also in Percival and Enmore rivers about six years ago. In fact, the mortality has been so widespread that it is desirable to use only stock resistant to the disease in all outlying areas where no large local stocks already exist. This has delayed the development in the province as a whole while resistance of Malpeque oysters to the disease was being demonstrated and small quantities planted experimentally in a number of places. The basis has now been laid for the expanding use of Malpeque stock in many other areas. An effort is now needed to make Malpeque stock available for use in other areas and if such a program is pursued there is good prospect of extending the development which has hitherto occurred on a large scale only in the Malpeque-Cascumpeque region. Other factors which have played a part in preventing a further increase are reduction of the investment of new capital in the Malpeque-Cascumpeque region and transition in Bedeque bay from the first poorly organized attempts to sounder relaying procedures. These factors are considered in greater detail later.

Malpeque-Cascumpeque Region.—Conditions continued promising in this region where oyster farming first became established and where the benefits of experimental farming and other activities of the department have been felt most directly. Additional information on the industry in this region is given in Table II.

TABLE II.—OYSTER FARMING IN THE MALPEQUE-CASCUMPEQUE REGION, 1935 TO 1939

	1935	1936	1937	1938	1939	Total 1935-39
1. Barrels of oysters planted.....	1,303	3,342	3,192	5,968	5,630	19,435
2. Concrete-coated spat collectors used (egg-crate fillers or their equivalent).....	3,350	13,600	55,600	98,000	71,700	242,100
3. Barrels of oysters sold.....	979	1,093	1,948	3,451	3,224	10,695
4. Receipts from sale of oysters (estimated at \$8.00 per bbl.).....	\$7,832	\$8,744	\$15,584	\$27,608	\$25,792	\$85,560
5. Wages paid by oyster farmers.....	\$2,137	\$6,077	\$11,532	\$17,971	\$17,340	\$55,057
6. Money spent for materials used.....	\$1,665	\$7,351	\$14,305	\$27,484	\$21,022	\$71,827
7. Total cash expenditure.....	\$3,802	\$13,428	\$25,837	\$45,455	\$38,362	\$126,884
8. Days' work by lessees or unpaid assistants.....	1,126	3,321	4,300	7,022	5,315	21,084
9. Value of (8) at \$1.75 per day.....	\$1,971	\$5,812	\$7,525	\$12,289	\$9,302	\$36,899
10. Total expenditure.....	\$5,773	\$19,240	\$33,362	\$57,744	\$47,664	\$163,783
11. Excess of total expenditure over receipts.....	—\$2,059	\$10,496	\$17,778	\$30,136	\$21,872	\$78,223
12. Excess of cash expenditure over receipts.....	—\$4,030	\$4,684	\$10,253	\$17,847	\$12,570	\$41,324

It is impossible to give adequate figures for many aspects of the development such as, for example, cleaning and hardening of ground, removal of mussels or starfish, separation of clusters, spat collection through cleaning ground at the proper time, transfers of oysters from producing and growing grounds to maturing grounds, etc. In these ways much effective work is being done for which no details are given in Table II although it is included in the figures for the totals of work and materials used in development.

The total expenditure in 1939 was about \$47,500—a slight decrease below 1938. The yield also decreased slightly. The effort which was made in 1939 is still large enough to lay the basis for a much higher production in the future. A review of the history of the development in this region is necessary in order to explain the situation.

Private oyster farming was first encouraged in this region in 1931. Figures for the activity in the first four years are not available but Table II shows that up to 1935 the development was rather slow and that in that year the value of the oysters produced was greater than the estimated total value of work and materials used. From 1936 to 1938 expansion was very rapid so that the effort to grow oysters was ten times as great in 1938 as in 1935.

The expansion was due largely to the entrance of enterprising groups into the field and the effort was largely in the form of spat production and intensive rearing methods as is shown by the corresponding increase in the use of cardboard spat collectors.

Some oyster farmers who made an early start have already reached a profitable stage and the possibility of making oyster farming pay has been demonstrated. (See also section on "Experimental Farming" below.) However, experience has shown that those engaging in the industry on any considerable scale and basing their efforts on actual production and rearing of spat cannot reach a profitable stage in less than five years. In fact, spat collection and intensive rearing does not lead to production of good quality

oysters in less than that period. It can, therefore, be seen that the rapid increase in effort from 1935 to 1938 can be expected to lead to a corresponding increase in production only in the years following 1940.

The large expenditures of the past few years were the result of an increasing interest in oyster culture in the region, which appears now to have reached a peak. It seems probable that there will be no further considerable increase in the effort to grow oysters until those who are now engaged in the industry reach the stage of profitable production. The industry has just passed through a phase of rapid expansion which is expected to lead to a great increase in production in the immediate future. Expenditures are being continued on a sufficiently large scale to maintain the production at the higher level which will probably be reached in the next four years. The industry in this region is, thus, passing through youth to maturity. It can hardly be considered mature until the receipts are greater than the expenditures. It is obvious that close supervision and readiness to make administrative adjustments as well as improvements in methods will continue to be very important until the industry reaches the mature stage where it is wholly self-supporting.

The size of the development is shown in Table II. Over \$125,000 was spent in actual money in the five years 1935 to 1939 and sufficient time was spent by lessees to make the total effort more than \$160,000. The total value of the oysters marketed is estimated at about \$85,000, leaving an investment in excess of receipts of about \$78,000. The industry will not show a profit until the production exceeds the expenditures. At the level which was reached in 1938 and maintained in 1939 and at present market prices this requires that a production of about 8,000 barrels be reached. It is believed that there is good prospect of this production being reached and even exceeded by 1943, five years after the present level of expenditure was reached.

TABLE III.—OYSTER FARMING IN THE MALPEQUE-CASCUMPEQUE REGION IN 1938, SEPARATED ACCORDING TO AMOUNT OF CASH EXPENDITURE BY OYSTER FARMERS

	Indi- viduals or groups spending over \$500 Cash (13)	Indi- viduals or groups spending \$100 to \$500 Cash (20)	All Others	Total
1. Barrels of oysters sold.....	1,775	510	1,166	3,451
2. Receipts from sale of oysters (at \$8.00 per bbl.)...	\$14,200	\$4,080	\$9,328	\$27,608
3. Wages paid.....	\$16,397	\$1,021	\$553	\$17,971
4. Money spent for materials.....	\$19,807	\$3,272	\$4,405	\$27,484
5. Days work by lessees or unpaid assistants.....	1,077	1,485	4,460	7,022
6. Value of (5) at \$1.75 per day.....	\$1,885	\$2,599	\$7,805	\$12,289
7. Total cash expenditure.....	\$36,204	\$4,293	\$4,958	\$45,455
8. Total expenditure.....	\$38,089	\$6,892	\$12,763	\$57,744
9. Excess of cash expenditure over receipts.....	\$22,004	\$213	—\$4,370	\$17,847
10. Excess of total expenditure over receipts.....	\$23,889	\$2,812	\$3,435	\$30,136
11. Receipts as percentage of cash expenditure.....	39%	95%	188%	61%
12. Receipts as percentage of total expenditure.....	37%	59%	73%	48%

It has often been asked who profits from the development of oyster farming and it has been suggested that those in poor financial circumstances are not able to do so. Table III shows figures for the operations in 1938 of three groups separated on the basis of how much cash was spent. As shown above the industry as a whole has not yet reached the stage of realizing profits and Table III shows that this is especially true of those making the largest expenditures of actual money. They actually spent more in wages than the

value of the oysters they sold which covered less than 40 per cent of the cash outlay. The intermediate group received enough to cover the expenditure of money with nothing left over to pay for their time. The smallest operators received almost twice as much for the oysters sold as they spent in actual money. Estimating the value of the time spent on the basis of \$1.75 per day these smallest operators also failed to realize a profit but they did receive enough for their oysters to pay for the cash outlay plus an average wage of about \$1 per day for their time. Thus, not only did the poor man benefit by the payment of wages by large operators but alone was able, even at this early stage, to cover expenses and make some return for his time.

The use of both natural grounds and floating trays for intensive rearing of separate spat increased again in 1939. Operations of this kind were successful on gravel flats and on sheltered shores. Over 2,000 barrels of small single oysters were reared on trays in 1939 as well as several hundred more along sheltered shores. Intensive rearing is now the principal source of planting stock and the extent of the operations has justified the policy adopted in 1938 of leasing sheltered creeks for the rearing of small oysters.

There was a decrease in the number of cardboard spat collectors used in 1939 as compared with 1938. This was due in part to small stock carried over from the 1938 settlement of spat and partly to realization that a smaller supply of spat than that obtained in 1938 was adequate for the rearing operations which could be financed.

Two oyster farmers, B. Clark and V. T. Travers, invented a machine for the separation of spat from cardboard collectors which promises to have a considerable effect on the industry. The machine breaks up the collectors bearing spat between a rotating drum with baffles and wire netting, the whole operation being under water in a wooden tank. This has reduced the total cost of separate spat to about fifteen cents per thousand, considerably less than half of the cost when spat is separated by hand. Experiments have shown that the spat is not appreciably damaged by the machine. This development is expected to lead to an increase in spat collection on cardboard egg-crate fillers as the cheapness of the separated spat makes it possible to run greater risks in rearing without serious financial loss.

The Fisheries Research Board, in co-operation with the department, made predictions again in 1939 of the settlement of oyster spat in several areas. The industry in this region has made thorough use of these predictions and the service is a valuable one which should be continued.

The bounty paid on starfish in the two preceding years was not continued in 1939. It served a useful purpose in encouraging the capture of starfish and in demonstrating that they could be reduced in numbers by mopping. Sufficient funds were not available, however, for payment of the bounty on a worthwhile scale and the experimental purpose had been achieved.

As reported in greater detail below, experiments in the use of lime for killing starfish have reached a promising stage and it is hoped that this new method will enable the industry to overcome the starfish problem with less expense.

Mortality of Oysters.—During the past few years serious mortalities of oysters have occurred in the Charlottetown region and in certain small outlying areas in Prince Edward Island. A similar mortality occurred in the years following 1915 in the Malpeque-Cascumpeque region. These mortalities were apparently caused by an epidemic disease among the oysters. The available evidence indicates strongly that the same disease was responsible for both the early mortalities in the Malpeque-Cascumpeque region and those which have occurred recently and that the present Malpeque stock, which is bred from survivors of the earlier epidemics, is resistant to the disease. The history of the mortalities and the evidence of the resistance of Malpeque stock were reviewed in the report on oyster culture for 1938-39.

Investigations in 1939 provided further evidence of the resistance of Malpeque stock to the disease. In experiments which were already in progress Malpeque oysters exposed to the disease continued to survive well. In Brackley Bay and Enmore River Malpeque oysters have now been held in close proximity to native survivors for two years. In neither case have the Malpeque oysters shown serious mortality while the natives showed poor survival and poor growth.

Evidence of the resistance of Malpeque stock to the disease seemed so good that in 1939 further steps were taken towards re-establishment of the industry in the Charlottetown region and at Enmore River by the introduction of Malpeque oysters. At Johnston's River, a tributary of Hillsborough River, 100 barrels of Malpeque oysters were planted in June. Johnston's River was selected as a small isolated inlet in which the surviving native oysters were so few that the introduced Malpeque stock might dominate spat production. In this way it was hoped that spat of the resistant strain might be produced locally. The experiment is still in progress and a similar planting on a smaller scale was made at the head of Enmore River.

The mortality has been a serious hindrance to the development of oyster culture in Prince Edward Island except in the Malpeque-Casumpeque and Bedeque Bay regions. The widespread occurrence of such a disease makes it extremely risky to use non-resistant native stocks for oyster farming and, on the other hand, the resistance of Malpeque stock was not until very recently sufficiently well established to warrant encouraging its use. It is believed that the time has now come when a definite effort should be made to make Malpeque stock available to those wishing to grow oysters in all areas in the province except the Bedeque Bay region where a large local stock which might be susceptible to the disease is already present. The history of the disease in the Malpeque Bay region, at Enmore River and in the Charlottetown region has been consistently the same. A very serious mortality occurred which spread progressively. In succeeding years the few survivors produced "sets" of spat which were at times numerous but most of which died before reaching marketable size. It is probable that this behaviour will continue and that although considerable quantities of small oysters occur now in the Charlottetown inlets the natural recovery would not eventually be more rapid than it was in the Malpeque Bay region. In that region the stocks were still only an extremely small proportion of their original size twelve years after the epidemic. By basing oyster farming operations in the areas affected by the disease on the resistant Malpeque stock it is hoped that the industry may be re-established more rapidly and that effort will not be wasted on handling small oysters now occurring there which are susceptible to the disease and likely to die before reaching marketable size.

If Malpeque stock is to be made available to oyster farmers outside the Malpeque Bay region it will be necessary to maintain the production on the department's areas at as high a level as possible. Planting stock is already in such good demand in the Malpeque Bay region itself that private sources cannot be relied on to supply outside demands. The resistance of the Malpeque stock gives it a special importance and means that the interests of the industry as a whole depend on a high production in the region.

Experimental Farming.—The Department of Fisheries in 1939 continued experimental farming in close co-operation with the Fisheries Research Board. The scientific investigations by the board have been designed to develop oyster culture methods and to provide a sound basis of knowledge for the administration and development of the industry. The department has carried out larger scale trials of methods based on scientific investigations.

The great development of oyster farming is shown elsewhere in this report and it has also been pointed out that the industry has not yet reached the mature stage of realizing profits. Our knowledge of the oysters and the conditions affecting their production must be made to keep pace with the needs of the industry. The development and demonstration of further improvements in oyster culture methods must be continued and these are the aims of the experimental farming.

The industry has shown to a high degree the co-operation necessary to make the results of this work successful. It has shown an eagerness to try out new methods and enterprising oyster farmers have developed improvements in application and in practical technique.

Headquarters for all experimental oyster farming by the department and the board are maintained at Ellerslie where areas have been set aside for that purpose on a tributary of Malpeque bay and where the board has established the Prince Edward Island Biological Station. The special needs of other localities are, however, borne in mind. Many of the results obtained at this central experimental farm are applicable elsewhere with minor variations but investigations, demonstrations or operations for the provision of stock are carried out elsewhere to meet special local needs. Thus, in 1939 intensive investigations were continued at Orangedale and at Malagash, Nova Scotia, where a general attack is being made on the special problems of the Bras d'Or lakes and the gulf of St. Lawrence coast of Nova Scotia (see below). Investigations and experiments were carried on in the Charlottetown region in connection with the oyster mortality and minor investigations have been carried on in other localities. It is pointed out, however, that the extension of intensive work to outlying areas is limited by the expense and by the availability of trained personnel necessary for proper supervision.

Results of Investigations and Experiments.—The results of experiments to develop improvements in oyster culture methods are reported in detail elsewhere. Space permits only a brief mention of the salient features of this work in 1939.

Predictions of settlement of oyster spat were made for the second time in 1939. With the assistance of two permanent seasonal inspectors it was possible to obtain in many places temperature observations, samples of oysters to observe spawning and tows with No. 18 bolting silk nets to obtain larvae. On this basis predictions of "sets" were made in fourteen places in the Malpeque-Cascumpeque and Bedeque Bay regions. Exceptionally high temperatures led to a shorter free-swimming period and smaller size at settlement than we have yet observed in our waters. Some groups of oyster larvae settled in less than three weeks after spawning. In connection with this work our knowledge of the free-swimming stage of mussels was extended. This is useful because it is necessary to avoid settlement of small mussels on materials placed in the water to collect oyster spat.

The importance of the knowledge of conditions necessary for fattening oysters has been made plain by the serious effects of thinness on the value of oysters in the Bras d'Or lakes and in certain areas which have been used for relaying. In 1939 a start was made in determining the fatness of oysters at various times and places and comparing it with various conditions which might be responsible. It is already apparent that the food supply varies a great deal and that it is probably the most important single factor in determining the fatness of the oysters. Although it would not usually be possible to influence the supply of food, which consists of microscopic plants and animals in the water, it is, nevertheless, important to be able to assess the food supply and predict whether oysters can be brought to good marketable condition in any area under consideration.

In 1939 experiments were continued in the use of quicklime for killing starfish on oyster grounds. Earlier investigations had shown that quicklime did not harm commercially valuable species occurring on oyster grounds and further experiments in 1939 indicated that its effects on the microscopic plants and animals providing food for oysters and other animals and on the small free-swimming oysters themselves would be negligible. Using a fertilizer spreader of the whirling disc type 500 pounds of pulverized quicklime per acre was spread on oyster grounds. In these experiments about half of the starfish were killed. Somewhat coarser lime spread in the same way killed about two-thirds of the starfish. It is hoped that further improvements which might include prevention of air-slaking before the lime is used and the spreading of somewhat larger quantities will make this method highly effective. The spreading is cheap both in labour and equipment. Four men using special equipment costing about \$100 can treat several acres in an hour. It is believed that the method will be a cheaper and more effective substitute for mopping.

In 1939 the Cooper bed, which is the ground most suitable for producing high quality oysters in the department's experimental areas at Ellerslie, yielded over 100 barrels per acre. This quantity consisted of a good quality oyster produced largely by the planting of small oysters obtained on cardboard spat collectors and reared on floating trays. Judging from the quantities of smaller oysters remaining on the ground this yield is believed to exceed the possible average annual yield very slightly if at all. The results of operations on this ground have demonstrated the high yield that is possible per acre but they also emphasize the long period necessary to attain such a yield with such methods.

The operations on the department's central experimental farm at Ellerslie were self-supporting in 1939 and actually yielded a small profit. The revenue was obtained largely by sale of oysters from the high quality grounds mentioned in the last paragraph and was also augmented by the sale of spat collectors and small oysters for planting purposes. The department is not intentionally in the oyster business but sells oysters produced in experiments and demonstrations and provides planting stock at approximate cost. No attempt is made to make a profit and the work includes much that is purely experimental and does not produce revenue. That the operations can be self-sustaining under the circumstances clearly indicates the possibility of profitable oyster farming.

Further investigations were continued along many other lines which cannot be reported here.

Provisions of Planting Stock.—In 1939 sales of 111 barrels of small oysters were made to lessees for stocking purposes. The demand has been so great that the department is unable to satisfy any considerable proportion of it. The policy has, therefore, been adopted of limiting the sale of planting stock to any individual or group to ten barrels. This increases the usefulness of the oysters the department can supply in enabling those entering the industry to make experimental plantings.

During the year 2,408 cardboard spat collectors bearing spat were sold. The sales by the department now constitute a very small proportion of the private production. It seems desirable, however, to continue the production of limited quantities of spat for sale in order to assure at least a limited supply for outside areas and for those just entering the industry.

The policy of issuing permits to lessees to pick oysters for stocking purposes in the shallow shore zone where winter mortality is high was continued in 1939. This policy has led to the transfer of large quantities of oysters into deeper water thereby saving them from the winter killing which would otherwise have destroyed a large proportion. Its relative importance as a source of planting stock is, however, continually decreasing. In 1939 the season in which

picking of this kind was permitted was reduced from two months to a month and a half. A sufficiently large number engaged in picking to make use of the available stock in that period and supervision was made less expensive and more effective by the reduction in the search.

Revenue.—Table IV summarizes the revenue from oyster culture operations in 1939. It shows a considerable increase over that in 1938-39. In addition to the sales of small oysters and spat the department in 1939 sold

TABLE IV. REVENUE FROM OYSTER CULTURE, 1939-40

	1939-40	Cf. 1938-39
	\$ cts.	\$ cts.
Sale of 2,448 cardboard spat collectors bearing spat at \$0.15.....	367 20	505 20
Sale of 17 bbls. collectors with spat at \$0.75.....	12 75	.....
Sale of wire containers for spat collection.....	3 10	36 20
Sale of 111 bbls. small oysters for planting at \$3.00 per bbl.....	333 00	579 00
Sale of market oysters from experimental farm:		
170 bbls. ordinary at \$6.65.....	1,130 50	385 00
151 bbls. ordinary at \$7.10 (\$7.50 in 1938-39).....	1,072 10	1,125 00
246 bbls. medium at \$9.30 (\$10.00 in 1938-39).....	2,287 80	530 00
74 bbls. medium at \$9.00.....	.....	666 00
143½ bbls. select at \$12.05 (\$12.50 in 1938-39).....	1,729 18	625 00
55½ bbls. select at \$12.05.....	.....	668 78
Sale of 13 bbls. oysters from St. Ann Bay, N.S.....	.....	57 32
Fees for resurveys of boundaries of leases.....	27 50	21 50
Royalty on oysters taken from leases and rentals on leases.....	2,044 01	1,758 27
Total.....	9,007 14	6,957 27

710½ barrels of marketable oysters at an average price of \$8.75 as compared with 437½ barrels of marketable oysters at an average price of \$9.14 in 1938. The total revenue exclusive of rentals on leased areas and royalties was \$6,963.13 in 1939. The addition of rentals and royalties makes the total revenue in 1939 \$9,007.14.

Of the revenue \$8,879.90 was from Prince Edward Island and \$127.24 from Nova Scotia. It is not possible to separate expenditures in the two provinces accurately in detail and the following is, therefore, only an approximation. Of an expenditure of about \$15,000 in Prince Edward Island almost two-thirds was covered by revenue, leaving a net cost to the government of work under the oyster culture appropriation of little more than \$6,000. In Nova Scotia where the development is still at a much earlier stage the revenue was not sufficient to reduce the net cost of the work much below an expenditure of about \$8,000.

Field Day for the Prince Edward Island Oyster Growers' Association.—For the fourth consecutive year a field day was held at the biological station at Ellerslie on August 23 in co-operation with the Prince Edward Island Oyster Growers' Association. Interest was again shown in exhibits illustrating various aspects of the industry. The marketing of oysters was again specially featured. An address was made by Mr. A. E. Fortington, of the Commercial Intelligence Service of the Department of Trade and Commerce, on the prospects for an export market for oysters and on the facilities which that department has to offer.

B. NOVA SCOTIA

The present oyster areas of Nova Scotia fall naturally into two distinct divisions—the Bras d'Or Lakes of Cape Breton and the Gulf of St. Lawrence coast. Oysters might possibly be grown elsewhere but prospects for profitable oyster culture are believed to be much better in these two regions than anywhere else in the province.

The conditions in the two regions are widely different from each other and from those of the north shore bays of Prince Edward Island. Intensive investigations have, therefore, been necessary to adapt cultural methods to the special local conditions.

As the agreement between the Dominion Government and the government of Nova Scotia was not completed until 1936 the present oyster culture program is still in an early stage of development in the province. Actual private oyster farming has as yet only commenced on a very small scale.

Bras d'Or Lakes.—A preliminary survey of the oyster areas of the Bras d'Or Lakes was made in 1934 and some minor supplementary investigations in 1935. Intensive investigations were commenced in 1936 and are still in progress. The work in 1939 was concerned with the special problems of the region regarding both production and marketing. Special attention was paid to an attempt to develop the shipment of shelled oysters in bulk as a new outlet to relieve the difficult marketing situation. Progress was also made in the consideration of applications for oyster leases and in surveying the areas.

The general prospects for profitable oyster culture in the Bras d'Or Lakes are not very good unless the marketing of oysters can be improved. Although spat collection is very successful growth of oysters is slow and quality low. The difficulties of the situation are given in greater detail below.

Problems of Production.—In 1939 experimental spat collection with both concrete-coated cardboard collectors and brush was again successful. The region has excellent conditions for the production of spat both as regards the actual numbers which settle and the availability of enough shelter to reduce risk of damage by storms to a minimum. If the demand arises and if Bras d'Or Lakes spat is found to give satisfactory results the region could provide a good source of spat for use in other areas.

Good spat production also occurs naturally in the region. The relatively poor growth of microscopic plants leaves the eel-grass unusually clean and large quantities of small oysters are produced along the shores from settlement of spat on the eel-grass. This provides a potential source of planting stock which was exploited to a moderate extent in 1939.

Experiments in the intensive rearing of spat again gave unsatisfactory results in 1939. Growth of separate spat in floating trays is much slower in this region than in the Malpeque region and others which have been under observation. The natural growth of small oysters on the bottom is also much slower than average. The slow growth which increases expense together with the presence of adequate supplies of natural seed stock close to shore makes intensive rearing unprofitable.

The relatively poor food supply offers an explanation of the slow growth of oysters in the Bras d'Or Lakes. Evidence that the quantities of oyster food are low has been obtained from tows with fine plankton nets and counts of the microscopic plants in water samples. It is also indicated by the unusual clearness of the water and the relatively slight fouling of surfaces. No practical way of improving this condition has been developed.

The poor food supply also offers a possible explanation of the relatively poor condition of Bras d'Or Lakes oysters. Measurements in 1939 have confirmed the impression that Bras d'Or Lakes oysters are thinner than the average. This is not so pronounced in certain areas, for example Malagawatch, as in Denys basin and food is apparently more abundant in those areas. They are more worth while developing and the average fatness of Denys basin oysters can be improved by transfer as has been shown by experiment.

It must, however, be realized that even transfer to areas with saltier water and better food supply will not make the oysters of the Bras d'Or Lakes of really good quality for the shell trade.

The conditions for the production of oysters in this region are now well established and may be summarized as follows: Spat production is excellent but growth is slow and the oysters tend to be fresh in flavour and to have thin meats. Production may be cheap in spite of the slow growth but the quality of the oysters can satisfy only relatively low-priced markets.

Problems of Marketing.—The most serious and immediate problem of the industry is to improve marketing rather than production. The oysters now realize low prices and command only an uncertain market. This is discouraging to the development of oyster farming. At the present time the oysters are all shipped in the shell and the difficulties will be aggravated by increased production of high-quality shell oysters elsewhere. General improvement will be possible only if quality can be improved or if other outlets can be developed to provide a more reliable market.

The poor quality consists in thinness of the meats, freshness of flavour, relatively weak chalky shells and a dark edge to the mantle. Experiments have shown that transfer to saltier waters improves the saltiness of the flavour and the fatness of the meats but the shells remain poor and the colour of the mantle improves very slowly. The increase in value is apparently not sufficient to repay the expense.

It is, therefore, necessary to attempt to improve marketing by grading and by developing other outlets than the shell trade. Better grading has been shown to improve marketing slightly but it remains difficult. The two obvious remaining possibilities are the sale of the oysters shelled and in bulk and the canning of oysters.

In 1939 the Department of Fisheries co-operated with the Nova Scotia Marketing Board in an attempt to explore the possibilities of shipping Bras d'Or Lakes oysters shelled and in bulk. The department sent Inspector P. W. Smith to New England to learn details of shucking methods. He was very kindly given every opportunity to obtain information by the Warren Oyster Company and was successful in learning the methods and giving instruction in them after his return. The department also provided some of the equipment used in experimental shucking. The Nova Scotia Marketing Board assisted in the marketing of the product and the actual operations were carried on by a small local organization known as the Bluemantle Oyster Association.

In the experiments the United States' methods were followed closely. They are in brief, the shelling of the oysters, the washing of the drained meats in fresh water and the packing of the washed meats in cans which are then shipped in ice.

The experiment showed that a product comparing favourably with the bulk oysters imported from the United States could be obtained from Bras d'Or Lakes oysters. Valuing the original oysters at \$2.50 per barrel and marketing the shelled oysters through ordinary wholesale channels there was a loss in the experiment of just over \$1 per barrel. The loss was largely attributable to an unusually low yield of shelled meats per barrel which, in turn, was caused by the thinness of the meats.

Although these results are not very encouraging it is hoped that the cost of production may be reduced. The oysters should perhaps be given a lower valuation which might reduce the loss by about fifty cents. The labour cost could probably be lowered with more experience. The reduced cost of production might be associated with a higher price for the product by marketing more directly to local consumers. There is also a possibility that the shells might be used profitably for the production of poultry feed. Further experiments are planned for 1940.

Preliminary experiments in canning Bras d'Or Lakes oysters indicate that they cannot compete with other cheap oysters from the southern states. The thinness of the Bras d'Or Lakes oysters is a disadvantage in this field as well as in the marketing of oysters in the shell or shelled.

Leasing of Oyster Grounds.—Over 105 applications were received in 1938-39 and the total passed 163 in 1939-40. Of these, 122 have been examined and approved and 96 surveyed. Care has been necessary in the examination of areas before approval in order to make effective the policy of leasing only grounds capable of producing relatively good oysters for the region.

Development of Leased Areas.—Oyster culture work by lessees in this region is summarized in Table V. The effort was not large because the program was started recently and because the poor market is somewhat discouraging.

In 1939 the picking of small oysters in shallow water along the shore was permitted. About 130 barrels of small single oysters were obtained by lessees and planted on their areas. A few private individuals carried on some spat collection with brush.

The production includes some from provincial leases which have been in force for a considerable period as well as that from areas newly leased. The value of the oysters sold was apparently about sufficient to cover the cost of the effort even including time spent by the lessees. There was, thus, no excess of cash expenditure over receipts.

Northumberland Strait.—A preliminary survey of this region was made in 1936 and intensive investigations of the special problems were commenced in 1937 in the Wallace-Tatamagouche area which is the most important producing area of the region and offers typical conditions for study. These investigations have been continued in 1939 and are still in progress. Further general survey of conditions in other parts of the region is required and will be carried out as opportunity permits. The region as a whole produces a smaller quantity but higher quality of oysters than the Bras d'Or Lakes region. Its problems, therefore, concern production rather than marketing. It differs both from the Bras d'Or Lakes and the north coast of Prince Edward Island in its large tides and in the number of large streams tributary to oyster-producing inlets. The large tides make tidal flats of great importance both in the natural production and in the potentialities of the region for oyster culture.

Investigations in 1939.—Experimental farming in this region has been centred at Malagash since 1937 when a reserve was set aside by the department for that purpose. In 1938 a permanent foreman was appointed, a small lot of land purchased and a small building erected. In 1939 the right-of-way was improved sufficiently to make the area accessible to cars and an additional small building was provided to house rough equipment.

At Malagash special attention has been paid to the potentialities of tidal flats for oyster culture. A dyke was constructed in 1937 of boards nailed to uprights driven into the bottom and banked on either side with mud, gravel and stone. It retains up to about 18 inches of water over about half an acre. A gate permitting the dyke to be drained was built in 1938 and a boom was provided to give additional shelter from wave action. The dyke has survived both ice action in winter and wave action in summer without serious damage in spite of its cheap construction.

Experiments in rearing separate spat in the dyke met with very good success in 1939. Growth was very rapid and although mortality was high on soft mud it was low on firm bottom. Good growth was obtained with concentrations as high as forty per square foot which would be over one and one-half million per acre or enough to produce 1,000 barrels after allowing for a loss of 50 per cent. If the demand for planting stock develops in this region it appears that dykes of this kind would probably pay.

Spat from the Bras d'Or Lakes was reared in the dyke in 1939 and survived and grew well. The quality of the oysters produced appear similar to that from local spat. If the results continue to be as satisfactory the use of Bras d'Or Lakes spat could be encouraged in this region.

Experimental spat collection at Malagash in 1939 yielded good sets on the bottom inside and outside the dyke and on materials suspended from floats. The latter gave poor shelter and there were serious losses. Inside the dyke there was a tendency for the cells of the collectors to fill in with silt. The seriousness of the effect of this is yet to be learned and a remedy devised. If satisfactory sets and good survival can be obtained from year to year in the dyke a cheaper method of spat collection than the suspension of collectors from floats would be provided even taking the costs of constructing the dyke into account.

There is a great natural production of spat and small oysters on bars exposed at low tide in Malagash Basin. If left on the bars heavy losses occur and the remaining oysters become clustered and of poor shape. The bars do, however, provide a great potential source of planting stock. Experimental transfer of such oysters in 1937 and in 1938 to firm sandy bottom outside Malagash Basin has led to good survival and reasonably good growth. Although the firm bottoms available in that vicinity seem somewhat exposed there has been no evidence of serious losses caused by shifting although heavy storms have occurred since the transfers were made. Oysters on these grounds were found to be very fat. It is believed that a considerable development of oyster farming is probable on similar grounds which have already been applied for.

Further investigations have indicated that there may be good winter survival in the dyke. Losses in previous experiments were apparently caused partly by damage before planting. Losses were much lower in the second winter in the dyke. Oysters of good shape appear to survive better. Further experiments taking these factors into account are in progress.

The oyster drill, a small snail which kills oysters, was discovered in this region in 1939. A search revealed its presence in localized areas in Merigomish and Caribou harbours and it may be present elsewhere. Where abundant it is a serious enemy of the oyster. Evidence was obtained of its having killed 25 per cent or more of the oysters on bars in Malagash Basin. Further investigations of its habits and of the damage it may cause to oysters are in progress.

The Department of Fisheries and the Fisheries Research Board co-operated in a survey of the shore mollusc resources of the Northumberland Strait coast of Nova Scotia which was carried on by the Nova Scotia Economic Council. It was principally a study of the distribution of molluscs which might be valuable, of their enemies and of physical conditions favourable to their culture. The detailed and extensive knowledge obtained in the survey will be valuable in formulating policies and in detailed administration.

Leasing of Oyster Grounds.—In this region no leases are being issued of areas now producing oysters in commercial quantities. Some applications have been refused on this basis at Caribou Harbour, Malagash Basin and Wallace Bay and River. Further progress was made in 1939 in the definition of the areas which can properly be considered to be producing oysters in commercial quantities.

To the end of 1939 over 45 applications were received. Of these about 34 were approved and about 25 surveyed.

Development of Leased Areas.—Oyster culture work by lessees in this region is summarized in Table V. It has been principally in the Caribou-Pictou area and in Tatamagouche Bay.

In Caribou Harbour and at Brule about 188 barrels of oysters were relaid from areas in Pictou Harbour closed to direct marketing for public health reasons. The relaying accounts for about 150 barrels marketed from these two areas. When it is remembered that some of the relaid oysters are probably

left on the grounds this indicates a good survival and satisfactory use of this method of purification. In this case the relaying areas were readily available and the quantities to be handled small.

The picking of small oysters occurring at high levels in Caribou Harbour was permitted and about 25 barrels were planted.

At Malagash the work was largely by former provincial lessees and consisted in the marketing of oysters and in the transfer of small oysters from bars to deeper grounds.

TABLE V.--DEVELOPMENT OF OYSTER AREAS UNDER CULTIVATION
IN NOVA SCOTIA IN 1939.

Region	Number of Areas under Cultivation	Approximate Total Area	Oysters Planted	Oysters Sold	Wages Paid for Development	Money Spent for Materials	Days' Work by Lessees	Value of Time by Lessees at \$1.75 per Day	Total Value of Work and Materials
		acres	(bbl.)	(bbl.)	\$	\$		\$	\$
Bras d'Or Lakes.....	70	151	130	413	44	479	388	678	1,201
Merigomish Harbour....	1	2	2	.....	.....	20	10	18	38
East River, Pictou Co..	4	20	16	.....	19	100	55	96	215
Caribou Harbour.....	11	37	208 ¹	134 ²	.....	40	336	588	628
Brule and Barachois									
Bays.....	3	5	48 ³	25 ²	10	6	7	11	27
Malagash Bay.....	6	25	30	130	31	20	98	172	223
Wallace Bay.....	2	6	9	5	.....	7	9	17	24
Total, Northumberland Strait.....	27	95	313	294	60	193	515	902	1,155
Grand Total.....	97	246	443	707	104	672	903	1,580	2,356

NOTE: ¹ Including 145 bbls. relaid for purification. Remainder picked on shores.

² All oysters refished after purification.

³ Including 45 bbls. relaid for purification.

C. NEW BRUNSWICK

After jurisdiction over Shediac Bay was transferred to the Dominion Government in 1931 investigations were carried on by the Biological Board and the Department of Fisheries in 1932 and 1933. They served to bring some of the special conditions of the area to light, especially the erratic local production of spat, and they provide a basis for a further attack on these problems. On account of the doubtful situation as regarded public health restriction of the fishery no more work was done in this area until 1939. The situation was clarified somewhat in 1939 and progress made towards provision of areas for relaying oysters for purification. The latter provides the only definite prospect of using the oysters although there is a slight possibility that better sewage disposal would make part of the area suitable for direct marketing.

The serious situation in New Brunswick, caused by the closure of many areas to direct marketing on account of sewage pollution, demanded attention. Preliminary consideration was given to the problems and an attempt is being made to make the best possible provision for purification of oysters.

D. GENERAL

Inspection and Marketing.—The importance to the Canadian oyster industry of improving the grading of oysters can hardly be over-estimated. It is essential to the establishment of stable prices and to the expansion of the market. As the Canadian production is expected to increase considerably in the next few years an effort is being made to establish the standard grades which are needed for organized marketing.

In 1938 the first grade, called "No. 1 Select Cup-Shaped," was defined and regulations were passed providing for inspection by the department's officers of oysters voluntarily submitted for qualification for this grade. In 1939 a second grade, "No. 2 Cup-Shaped," was added. Only oysters which have been inspected and found to conform to the definition of the grade can be labelled as "No. 1 Select Cup-Shaped" or "No. 2 Cup-Shaped."

In 1939 increased use of the grading was made by the industry. Time is required to make the grades familiar to the trade and to establish their reliability. It is believed that their value will then be recognized.

Inquiries were made during 1938 and 1939 regarding possible export markets, especially the British. There appeared to be definite prospects when the quantities warrant but the local market still absorbs the Canadian production. It is not considered desirable to enter the export trade until the supply for that purpose is sufficiently large and reliable. The outbreak of war has removed the favourable prospects in the British market for the present.

Public Health.—The relation between the oyster industry and public health is worthy of general attention because of its great importance to administrative policy and to operations by oyster producers.

Public health supervision of all food industries is a policy of long standing in our society. In the case of the oyster industry it is necessary in order to protect not only the public health but the industry itself. Experience in other countries has shown that outbreaks of typhoid or other diseases if attributed to oysters have a disastrous effect on the market. It thus becomes necessary to decide what areas are so dangerously polluted that the oysters in them cannot safely be used and to prevent the direct marketing of such oysters without purification.

The problems of public health supervision of the industry cannot be avoided and to disregard them only postpones a satisfactory solution. On the other hand, the prevention of direct marketing from areas considered dangerously polluted is causing much hardship. Unnecessary restrictions must be avoided and an effort must be made to provide the best possible means of using the oysters.

The seriousness of the problem is shown by the following list of areas already affected. Some of these are of minor importance but in others a large fishery is damaged. The list includes only those areas which have already been actually closed by regulation. Still others are under consideration. It is not believed an exaggeration to say that one-third of the oyster-producing area is affected.

The standards on which areas are classified as dangerously polluted or not have been based to a large extent on those in use in the United States. Although it would be unfortunate if unnecessarily high standards were applied it is not desirable to lower the standards generally so much that the risk becomes considerable. Further careful investigation may at times lead to the opening of areas now closed to direct marketing and it may provide definite evidence of the safety of removing oysters from polluted areas at certain seasons. There is, however, no prospect of any major improvement of the situation from a change in the standards. The only profitable course is to improve the methods of purifying dangerously polluted oysters so that they can be marketed.

Two possible methods of purification are in view—so-called "chlorination" and relaying in pure waters. The former process, which consists of disinfecting the outsides of the shells and making the oysters feed in two 24-hour changes of sterile water, has been used successfully in England where the average value of oysters is several times as high as in Canada. The process in its present stage of development is too expensive for our conditions. We must, therefore, place reliance for the present on relaying in pure waters. In this method oysters from

polluted areas are replanted in pure water for a considerable period which is sufficient to make them safe. The fishery regulations already make provision for the relaying of polluted oysters for purification.

Oysters are purified by relaying extensively in the United States but the method is not without its difficulties or expenses. It has been noted above that small scale operations of this kind were carried on in the Pictou area without serious losses. At Summerside, on the other hand, where the quantities were much larger, the attempted use of this method resulted in serious losses, largely because the earlier operations were not carried out properly. It is evident from past experience that facilities for relaying must be prepared in ample time and the transition to relaying made sufficiently gradual to give time for educating the industry in the method. This is planned for future closures of polluted areas. Efforts to improve purification technique are also planned.

LIST OF AREAS IN WHICH DIRECT MARKETING OF OYSTERS IS PROHIBITED
BECAUSE OF DANGEROUS POLLUTION

Prince Edward Island

Summerside Harbour.—Entire producing area closed.

Charlottetown Harbour and Tributaries.—Over half of producing area closed.

Murray Harbour.—Small unimportant parts of tributaries.

Malpeque Bay.—Small areas at head of Trout River, and in tributaries of

Grand River; very small proportion of producing area.

Haldimand River.—Entire area closed but not important.

Tryon River.—Entire area closed but not important.

Victoria Harbour.—Entire area closed but not important.

New Brunswick

Shediac Bay.—Entire producing area closed.

Buctouche Bay.—Much of producing area closed.

Richibucto River.—Some of producing area closed.

Season restricted in:

Buctouche Bay.—Most of remainder of producing area.

Cocagne River.—Part of producing area.

Black River.—All.

Richibucto River.—Some of remainder of producing area.

Nova Scotia

East River, Pictou Harbour.—All.

APPENDIX No. 5

REPORT ON CANNED SALMON INSPECTION AND RESEARCH

BY

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OF FISHERIES

As indicated in previous reports, the duties of the Canned Salmon Inspection Laboratory are, firstly, to carry out the routine examination of parcels of canned salmon submitted for inspection; and secondly, to carry on investigations into problems concerned with, or closely allied to, the inspection of canned salmon. Among other things these problems deal with methods of measuring the various quality characteristics of canned salmon, with the variations in the averages and standard deviations of these characteristics throughout the season, and with the problem of drawing reliable inferences regarding the quality of a parcel from a knowledge of the mean and variability of the characteristic, or a combination of characteristics, shown in a sample drawn from the parcel.

During the past season the investigations carried out at the laboratory have been confined mainly to a study of the variations in the quality of canned sockeye (and later to other species of salmon) with a view to applying the resulting knowledge of trends in means and standard deviations to the accurate grading of this species, either on the basis of a single characteristic or by means of an index of quality combining the individual characteristics. The details of this phase of the work are given later in this report. It may be mentioned, however, that, as far as canned sockeye salmon is concerned, the laboratory, as a result of this investigation, is now in a position to grade this species into any convenient number of grades and to as great a degree of accuracy as may be desired, providing, of course, that the requisite number of samples for this latter purpose are available.

Quality of Canned Salmon Packed During 1938

The quality of British Columbia canned salmon packed during the 1938 season was in general similar to that of salmon packed during 1936 and 1937. In the case of the characteristics vacuum and net weight, which depend entirely on the nature of the container and the processing procedures followed by the various canneries, there were only slight variations in the averages and standard deviations relative to the corresponding statistics of the preceding years. In the case of the intrinsic characteristics of canned salmon, however, that is, firmness, red and yellow colours of the flesh, etc., which are only partly within the control of the canner, there were in some instances substantial differences in the averages of the quality characteristics as compared with those of the preceding years.

Summaries of the distributions of the various quality characteristics of British Columbia canned salmon inspected during 1938 are shown in tables I to VIII. Comparison of the vacuum measurements summarized in table I with the corresponding data given in the two preceding reports indicates that the average vacuum for the 1938 one-pound tall and one-quarter-pound flat sizes was slightly lower than the averages for the two previous years. To offset this decrease in average vacuum, however, the 1938 samples showed a consid-

erable reduction in standard deviation of vacuum in the one-half-pound flat and one-pound flat can sizes. In the case of both the average and the standard deviation the differences are not in all cases significant owing to the fact that in some instances the differences might have arisen through sampling fluctuations. To test whether or not these differences are significant we should, therefore, calculate the standard deviation of the difference in each case. This can readily be accomplished by applying the following formulas:—

$$\text{Standard deviation of difference between two means} = \sigma_d = \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$$

$$\text{Standard deviation of difference between two standard deviations} = \sigma_d = \sqrt{\frac{1}{2} \left(\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2} \right)},$$

where σ_1 , σ_2 and n_1 , n_2 are respectively the standard deviations and sample sizes of the two sets of measures. For example, the standard deviation of the difference in average vacuum between the 1936 and 1938 one-pound tall samples is

$$\sigma_d = \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}} = \sqrt{\frac{9.86}{2617} + \frac{11.30}{2091}} = 0.0958 \text{ approximately.}$$

If, therefore, a level of significance corresponding to 3σ is employed we have $3\sigma_d = 0.287$. But the actual difference was $9.79 - 9.22 = 0.57$ inches of vacuum. Hence we see that there was a significant decrease in average vacuum in the 1938 one-pound tall samples as compared with the 1936 samples of this can size. Similarly, on testing the difference in average vacuum between the 1937 one-pound tall samples and the 1938 one-pound tall samples we find that $3\sigma_d = 0.33$ inches, while the actual difference was $9.57 - 9.22 = 0.35$ inches. In this case, then, there was also a significant difference in the average vacuum.

To test whether or not the decrease in the standard deviation of the one-half-pound flat samples packed during 1938 as compared with the 1937 samples is significant we apply the second formula and find that $\sigma_d = 0.037$. Hence $3\sigma_d = 0.111$. The actual difference is $3.01 - 2.78 = 0.23$, and consequently there was a significant decrease in the standard deviation in vacuum of the 1938 one-half-pound flat samples relative to the 1937 samples. In this case the slightly poorer average vacuum is probably offset by the improvement in the standard deviation in vacuum.

A comparison of the averages and standard deviations of the net weight of samples of canned sockeye salmon inspected during 1938 (table II) with those of the preceding year indicates that there was a slight improvement in the average net weight of both these can sizes during the 1938 season. On testing the significance of the difference in the average net weight of the one-pound tall cans it is found that the standard deviation of the difference in average is 0.0164 ounces and hence $3\sigma_d = 0.0492$ ounces. The actual difference, however, was $16.86 - 16.80 = 0.06$ ounces, so that the difference in this case was significant. As regards variability in net weight, the 1938 one-pound tall samples are slightly inferior in this respect compared with those of the previous year, while in the case of the one-half-pound flat samples there was a slight improvement in the 1938 samples over those packed during 1937. The differences in standard deviation, however, are barely significant, as may readily be shown by calculating the standard deviation of the difference in this statistic for the 1938 and 1937 one-pound tall samples. On applying the above formula it is found that $\sigma_d = 0.0116$ so that $3\sigma_d = 0.0348$, while $2\sigma_d = 0.0232$. The actual difference,

however, is $0.49 - 0.46 = 0.03$ ounces. Hence in this case the difference is barely significant. In general, there are no changes of importance in the net weight of the one-pound tall and one-half-pound flat can sizes of sockeye salmon packed during 1938 as compared with samples packed during the two preceding years.

In considering variations in the intrinsic quality characteristics of canned salmon (tables III to VII inclusive) it should be borne in mind that the averages and standard deviations of distributions representing pooled samples over the year will be affected not only by the variations introduced in processing but also by the seasonal trends in the averages of these characteristics. To give complete information regarding the variations in the different intrinsic quality characteristics of canned salmon it would, therefore, be necessary to give the line of seasonal trend in the average for each characteristic together with the standard deviation of the characteristic around the line of averages or means.

The pronounced increase in the standard deviation in softness of the 1938 one-pound tall sockeye samples relative to the 1937 samples is probably due in large measure to an increase in the total seasonal variation in quality in the 1938 samples. The standard deviation of the difference in standard deviation in this case is 0.0517 or $3\sigma_d = 0.156$. The actual difference, however, is $2.50 - 1.68 = 0.82$. Hence the difference in standard deviation in this case is very marked. Similarly, the difference in the average softness of the one-pound tall samples of sockeye salmon packed during 1938 as compared with those packed in the previous year indicates a very substantial variation in this quality characteristic. The standard deviation of the difference in means in this instance is 0.0734 and consequently $3\sigma_d = 0.220$. Hence the actual difference is over four times $3\sigma_d$, namely, $8.54 - 7.52 = 1.02$ units of softness.

The firmness of the samples of blueback salmon packed during 1938 was similar to that of the samples packed during the two preceding years, with the 1936 samples showing somewhat poorer averages in this respect than the 1937 and 1938 samples. The same was true of the firmness of the samples of coho and spring salmon packed during the 1938 season when compared with the samples packed during the two preceding seasons. The firmness of the samples of pink salmon packed during 1938, however, was considerably better than that of the samples packed during the two preceding years, while the firmness of the samples of chum salmon packed during 1938 was substantially the same as that of the samples packed during 1936 and 1937. Finally, it should be noted that the order in which the various varieties of British Columbia canned salmon fall as regards average firmness remains substantially the same from year to year, that is, when the samples are arranged in descending order of firmness, the chum salmon are found to be the firmest followed by the three firmness groups, sockeye and coho, blueback, pink and steelhead, and lastly, spring salmon.

In view of the change in the procedure followed in carrying out the colour tests mentioned in last year's annual report and the possibility that the colour data for the 1936 season may not be rigidly comparable with those of the 1937 and 1938 seasons it appears advisable to limit the comparisons of means and standard deviations in intensities of red and yellow colours of the various species to the 1937 and 1938 data. These two sets of data reveal evidences of annual variations in the average intensities of both the red and yellow colours of the different varieties of canned salmon. The samples of sockeye salmon, for example, packed during 1938 were definitely poorer in average red colour than those packed during the preceding season. Similarly, the samples of blueback salmon packed during 1938 were poorer in red colour than those packed in the previous year. The 1938 samples of blueback salmon, however, were slightly better in average yellow colour than those of the previous year. The samples of coho and pink salmon packed during 1938 were somewhat better in both the

red and yellow colours, while spring and steelhead remained about the same in average red colour in 1938 as compared with the 1937 samples. The samples of chum salmon packed during 1938 were poorer in red colour but appear to have been slightly better in yellow colour than those packed in the preceding season.

Small differences in means and standard deviations of this quality characteristic should, of course, be disregarded when comparing corresponding figures in the two sets of data. As an illustration of the order of the difference that may be neglected in drawing comparisons, it is of interest to test whether the difference in mean intensity of the red colour of the sockeye samples packed in 1938 relative to those packed in the preceding year is significant. On applying the preceding formula it is found that in this case $\sigma_d = 0.0183$. Three times the standard deviation of the difference in means is, therefore, $3\sigma_d = 0.0549$. The actual difference in means is $6.29 - 6.12 = 0.17$ Lovibond units. Hence in this instance the difference is significant. When the sample size is smaller, however, as is the case with the blueback samples, allowance should be made for sampling fluctuations in the difference when comparing two averages or two standard deviations. Thus on calculating the standard deviation of the difference in standard deviation of the intensity of red colour of the two sets of samples of blueback salmon packed in 1937 and 1938 we find $\sigma_d = 0.0285$ and consequently $3\sigma_d = 0.0855$. The actual difference in standard deviation in this case, however, is $0.64 - 0.59 = 0.05$ Lovibond units, which is, therefore, not significant. In general, the means and standard deviations of the intensities of the red and yellow colours of the flesh tissue of the various species show definite evidences of annual variations in this quality characteristic.

Summaries of the total free oil in samples of 12 cans drawn from parcels inspected during 1938 are shown in table V. Comparison of the averages and standard deviations of the free oil in samples of 12 listed in this table with the corresponding figures of the two previous years reveals further evidences of annual changes in this quality characteristic of British Columbia canned salmon. Reference to table VI, which shows the average free oil in samples of 12 one-pound tall tins inspected during the 1936, 1937 and 1938 seasons, shows that there were appreciable changes in the average free oil during these three years in all the five major species, except possibly chum salmon.

Owing to the large standard deviation in the free oil content of samples of 12 tins, these differences will not in all cases be significant, since the difference may in certain instances have arisen through sampling fluctuations. Calculation of the standard deviation of the difference in mean free oil content in the one-pound tall sockeye samples packed in 1938 as compared with the samples packed in the previous year gives $\sigma_d = 4.434$ c.c. and consequently $3\sigma_d = 13.30$. The actual difference in this case is $76.3 - 53.8 = 22.5$ c.c. The difference, therefore, is quite significant.

In addition to the large standard deviations in the free oil content of samples of 12, the low sample sizes will, in some instances, very seriously reduce the significance of the difference in the average or the standard deviation. In the case of the blueback and spring species, for example, the sample sizes are in all cases much lower than those appearing in the other species. Hence, each of these differences would need to be tested by means of the above formulas for the standard deviation of the difference in means and standard deviations before it could be definitely stated that there were significant differences in the means and standard deviations of this characteristic in these two instances. It is probably safe to say that the 1938 one-pound tall samples of blueback salmon had a significantly higher free oil content than the samples packed in 1936, but it would be necessary to test the significance of the difference between the 1937 and 1938 averages before it could be safely concluded that the difference was significant.

Similar remarks apply to the one-pound tall samples of spring salmon packed during 1936, 1937 and 1938 and, of course, to the average free oil content of the one-half-pound flat sizes of the various species. In view of the larger sample sizes recorded under coho and pink salmon there is less danger of inaccuracies in the results on account of sampling fluctuations, so that, even without applying the tests of significance, it appears safe to conclude that there was a significant increase in the free oil content of the 1938 one-pound tall samples of coho salmon as compared with those packed in 1937, and a very pronounced increase in average free oil content of the one-pound tall samples of pink salmon packed during the 1938 and 1937 seasons relative to those packed in 1936.

The average free aqueous liquor in samples of 12 cans furnishes further evidence of the annual fluctuations in quality exhibited by the preceding characteristics. It is, however, again necessary to apply the tests of significance to the differences in means and standard deviations before it can be safely inferred that the changes in the values of these statistics are not due to sampling fluctuations. For example, the differences in mean free aqueous liquor between the one-pound tall sockeye samples packed in 1938 as compared with those packed in the two preceding years are not significant. The standard deviation of the difference in mean free aqueous liquor between the 1938 and 1937 samples was 14.89 c.c. Hence the difference in this case is not significant, since $3\sigma_d=44.67$ c.c., while the actual difference is only $881.6-860.1=21.5$ c.c. Similarly, the standard deviation of the difference in mean free aqueous liquor in the one-pound tall sockeye samples packed in 1938 relative to those packed in 1936 was 14.14 c.c. and hence $3\sigma_d=42.42$ c.c. The actual difference, however, was 32.4 c.c., which is therefore not significant, if the level of significance is $3\sigma_d$.

In the case of the standard deviation of the total free aqueous liquor in samples of 12 one-pound tall cans of sockeye salmon, however, it is found on applying the test for significance that the standard deviation of the difference in standard deviation in samples packed during 1938 relative to those packed during the previous year is 10.52 c.c. Three times this difference, namely 31.56, is less than $140.3-104.6=35.7$ c.c., the actual difference. Hence the difference in standard deviation in this instance is quite significant.

An interesting feature of this quality characteristic is the low standard deviation of the characteristic in the immature coho or blueback salmon as compared with the values of this statistic for the remaining species. This is true, in general, not only of the 1938 samples but also of those packed in the two preceding years. The effect appears to be more marked in the one-pound tall samples than in the one-half-pound flat samples.

As mentioned in last year's annual report, the freshness of the samples packed during 1938 fell somewhat short of the excellent standard in this quality characteristic attained in 1937. Table VIII shows that there was a substantial improvement in freshness in the 1938 samples relative to those packed in the two previous years, if the comparison is made on the basis of the sockeye samples alone. In 1936 the percentages of questionable, stale and tainted tins in the sockeye samples were respectively 2.21, 1.29 and 0.07, while the corresponding percentages for the 1937 season were 0.34, 0.05 and 0.00, respectively. The 1938 samples of sockeye salmon thus showed a further improvement as regards freshness over the samples packed in the two preceding years. In fact, the samples of sockeye salmon packed during 1938 leave very little room for further improvement in freshness, since there were no tainted tins present in the samples and the proportion of stale tins was vanishingly small. With the exception of springs and steelheads, however, the remaining species were all inferior as regards freshness to the samples packed during 1937.

RESEARCH WORK

The investigations carried out at the laboratory during 1939 have been continued along the lines indicated in the annual report for 1938. A very large proportion of the time available for this work has been devoted to a statistical investigation of the sockeye data collected during 1936, 1937 and 1938. The general purpose of the latter investigation has been to inquire into seasonal, geographical and annual variations in the intrinsic quality characteristics of British Columbia sockeye salmon. Some of the specific objectives of this work have been as follows: (a) To determine the variations in the averages of the various intrinsic quality characteristics of this variety of canned salmon; (b) to obtain reliable estimates of the standard deviations around the lines of means; (c) to investigate the functional forms of the distributions of the intrinsic quality characteristics around the lines of means as regards the statistics k and β_2 , and (d) to determine the correlations between the various characteristics. The statistics k and β_2 it should be mentioned, measure the skewness and kurtosis of the distribution and thus indicate how far the distribution under investigation departs from normal.

In the case of canned sockeye salmon it has been found that the distributions around the lines of means of the characteristics, firmness (measured in the new scale proposed by the laboratory), red and yellow colours of the flesh tissue, and free oil content (samples of 12 tins) are all closely normal and may be considered normal for all practical purposes. In addition, the statistical investigation has shown that the standard deviations of the intrinsic quality characteristics of canned sockeye salmon around the lines of means are, within sampling fluctuations, approximately constant during the season. This fact, together with the result mentioned above, that the distributions of the characteristics around the lines of means can, for all practical purposes, be considered normal, greatly simplifies the problem of grading. By applying a well known property of normal distributions, namely, that the sum or difference of two normally distributed characteristics is a normal distribution with variance equal to the sum of the variances of the individual characteristics, it is a simple matter to combine two or more of the four intrinsic quality characteristics of canned sockeye salmon mentioned above to give an index of quality that is normally distributed. Scientifically sound grading plans for grading canned sockeye salmon that will meet the requirements listed in last year's annual report can therefore be easily and rapidly set up. Whenever a decision is reached as regards the number of subgrades into which it is desirable to grade the present grade A sockeye, it will thus be possible to suggest immediately a number of alternative indices of quality upon which the grading may be based.

As an illustration of the method of setting up a sound practical grading plan when the variation in the average of the characteristic is known and also its standard deviation around the line of means, it is of interest to consider a simple grading plan for grading grade A canned sockeye salmon into two further classes on the basis of firmness. The maximum range in the average firmness for this species is about 8.3 units extending from about 7.5 to 15.8 units. Hence, since the better quality salmon has a higher average firmness than the poorer grade salmon, the best samples will fall in the interval immediately below 15.8 units. The grade B limit of softness for this species is 11 millimetres penetration, which is equivalent to approximately 8.9 units of firmness. The total range of the grade A samples in respect to firmness is therefore $15.8 - 8.9 = 6.9$ units of firmness. If the grade A salmon is further subdivided into two grades having equal ranges in firmness, and if, as suggested in last year's

report, the intervals are each equal to $6S$, that is, 6 standard deviations of the average, then the minimum sample size that should be employed will be given by the equation $12S_x = 6 \cdot 9$, where $S_x = \frac{S}{\sqrt{n}}$. The standard deviation S

in the last equation is the standard deviation in firmness around the line of means and S_x is the standard deviation of the average. In the case of canned sockeye salmon S is approximately 2.2 units. On solving these equations we therefore find that $n = 14 \cdot 6$, so that in order to grade according to this plan a sample size of not less than 14 or 15 tins should be employed. According to this plan, the limits of the average for the three grades of canned sockeye salmon would be: Grade B, below 8.9; grade A2, between 8.9 and 12.4; and grade A1, above 12.4 units.

In addition to the time given to the statistical investigation of the sockeye data and to the grading investigation, some time has also been devoted to a study of the distribution of the red and yellow colours of the flesh tissue of canned spring salmon. Preliminary work on the latter problem has shown that, as regards the intensities of the red and yellow colours of the muscle tissue, the spring salmon caught in British Columbia waters consists of two varieties. There are, however, apparently no more than two such varieties, since the distribution of the intensity of the red colour is clearly bimodal and consists of two component normal distributions. The distribution of intensity of the yellow colour also consists of two component normal distributions, but, on account of the extensive overlapping of the two component populations, is unimodal. In addition to possessing considerable scientific interest this information will be of value in the routine grading of this species on the basis of the intensity of the colour of the flesh or muscle tissue.

Further work has been done on the firmness research in preparing additional results of this investigation for publication and in fitting the instrument used by the laboratory with a scale giving firmness instead of depth of penetration. When it becomes necessary for routine grading purposes to change over the measurement of this characteristic from depth of penetration in millimetres to units of firmness, it will thus be possible to effect this change without any further work. Such a change, of course, will be imperative when the present grade A salmon is further subdivided into two or three subgrades.

Time has also been spent by the laboratory during the past year on certain other work not directly connected with the inspection and grading of canned salmon, but, nevertheless, of considerable importance to the salmon industry of British Columbia. Some of this work was carried out in co-operation with the Pacific Fisheries Experimental Station, Prince Rupert, B.C., and involved running colour tests on experimental samples of canned salmon and applying tests of significance to detect whether or not the average intensity of the red colour had been significantly increased by the treatment to which the samples had been subjected.

Other extra work had to do with the preparation of evidence for the inquiry into salmon trapping and seining operations in the estuary of the Fraser River and adjacent waters. Time was spent by the writer in carrying out calculations for testing the significance of the difference in the various quality characteristics of certain samples of canned salmon in which this inquiry was interested. Time also was consumed in preparing correlation data for this inquiry illustrating the extent of the reliance that may be safely placed on subjective estimates, and in checking over the transcript of evidence given by the writer at the hearings of the inquiry held in New Westminster and Vancouver.

Finally, some time was spent by the writer in attending the Sixth Pacific Science Congress held in July and August last year at San Francisco. It was the writer's privilege to attend the Fisheries Section of the congress and to

contribute a paper on the grading of canned sockeye salmon to one of the symposia held by this section. Generally speaking, as far as fisheries investigations are concerned, it appears that considerably more might be done towards more effective co-ordination of the efforts of the fisheries research organizations both within and between the individual countries. Also, it seems to the writer, that more rapid progress would be made in dealing with fisheries problems, if additional efforts were made to secure quantitative data. The application of modern statistical methods to fisheries problems on a more extensive scale would eliminate a great deal of the uncertainty as regards the meaning of the results in such investigations as net preservation, the number of salmon reaching spawning areas, effectiveness of cooking procedures, differences in quality, etc. The success that has attended the application of these methods to the study of variations in the quality of canned salmon suggests that it would also be very profitable to apply these methods to other problems arising in fisheries work.

Three papers were submitted by the laboratory for publication last year, namely, a second paper dealing with the measurement of firmness of canned salmon, a paper on the variations of the intrinsic quality characteristics of British Columbia canned sockeye salmon, and the paper mentioned above on the grading of canned sockeye salmon, which was read at the Pacific Science Congress.

TABLE I.—SUMMARY OF VACUUM MEASUREMENTS ON SAMPLES OF CANNED SOCKEYE SALMON INSPECTED BETWEEN JUNE 1, 1938 AND MAY 31, 1939

	1-lb. talls	$\frac{1}{2}$ -lb. flats	1-lb. flats	$\frac{1}{4}$ lb. flats	12-ounce
N.....	2,091	5,142	240	2,121	168
M.....	9.22	7.12	6.02	4.60	5.27
S.....	3.36	2.78	2.59	2.87	2.23
S ₁₂	0.97	0.80	0.75	0.83	0.64
R.....	pos. press. to 18 in.	pos. press. to 17 in.	1 to 16 in.	pos. press. to 18 in.	pos. press. to 14 in.
P:					
25%.....	6.75	5.23	4.22	2.69	3.79
50%.....	9.12	7.06	5.89	4.15	5.42
75%.....	11.62	9.09	7.32	6.20	6.72

N=Total number of tins examined; M=Average vacuum in inches of mercury; S=Standard deviation of distribution of single tins in inches of mercury; S₁₂=Standard deviation of average of 12 tins; R=Range in inches of mercury; P=Percentiles. Atmospheric pressure at sea level=29.9 inches of mercury.

TABLE II.—SUMMARY OF DISTRIBUTION OF NET WEIGHT OF CANNED SOCKEYE SALMON

	1937-38		1938-39	
	1-lb. talls	$\frac{1}{2}$ -lb. flats	1-lb. talls	$\frac{1}{2}$ -lb. flats
N.....	1,394	6,832	2,094	5,119
M.....	16.86	8.47	16.80	8.43
S.....	0.46	0.27	0.49	0.24
S ₁₂	0.13	0.08	0.14	0.07
R.....	13.95-18.45	6.7-9.5	13.95-18.15	7.25-9.85
P:				
25%.....	16.58	8.29	16.49	8.28
50%.....	16.85	8.46	16.80	8.42
75%.....	17.16	8.64	17.14	8.59

N=Total number of tins examined; M=Average net weight (arithmetic mean) in ounces; S=Standard deviation of distribution of single tins; S₁₂=Standard deviation of average of 12 tins; R=Range in ounces; P=Percentiles.

TABLE III.—SUMMARY OF DISTRIBUTIONS OF SOFTNESS (TEXTURE) OF SAMPLES OF CANNED SALMON DRAWN FROM PARCELS INSPECTED BETWEEN JUNE 1, 1938 AND MAY 31, 1939.

ONE-POUND TALLS							
—	Sockeye	Blueback	Coho	Spring	Pink	Chum	Steelhead
N	2,079	(x) 600	4,156	919	3,593	5,503	102
M	8.54	8.50	8.05	10.16	8.12	7.65	8.64
S	2.50	1.91	2.15	3.54	2.09	1.77	2.17
S ₁₂	0.72	0.55	0.62	1.02	0.60	0.51	0.63
R	4-32	5-19	3.5-27.5	3.5-41.5	4-30	4-23	5-18
P:							
25%	6.89	7.11	6.47	7.88	6.73	6.44	6.94
50%	8.13	8.30	7.71	9.34	7.78	7.40	8.42
75%	9.62	9.55	9.15	11.44	9.12	8.53	9.94

ONE-HALF POUND FLATS							
—	Sockeye	Blueback	Coho	Spring	Pink	Chum	Steelhead
N	5,088	(x) 435	3,514	1,093	1,782	2,867	186
M	8.19	8.56	8.18	9.82	8.55	8.81	8.34
S	2.45	1.87	1.87	3.47	2.24	2.77	2.44
S ₁₂	0.71	0.54	0.54	1.00	0.65	0.80	0.70
R	3.5-29.5	5-15	4-22	3.5-31.5	4-25	3.5-29.5	5-23
P:							
25%	6.48	7.19	6.86	7.62	7.08	6.80	6.76
50%	7.74	8.26	7.90	9.07	8.21	8.30	7.76
75%	9.26	9.58	9.18	11.13	9.48	10.16	9.42

N=Total number of tins examined; M=Average softness (arithmetic mean) in scale units; S=Standard deviation of distribution of single tins; S₁₂=Standard deviation of average of 12 tins; R=Range in scale units; P=Percentiles.

(x)=Immature Coho.

TABLE IV.—SUMMARY OF DISTRIBUTIONS OF COLOUR OF SAMPLES OF CANNED SALMON DRAWN FROM PARCELS INSPECTED BETWEEN JUNE 1, 1938 AND MAY 31, 1939

RED							
—	Sockeye	Blueback	Coho	Spring	Pink	Chum	Steelhead
N	5,046	661	4,308	1,194	2,937	4,371	187
M	6.12	5.49	4.85	4.10	3.22	2.41	3.69
S	0.81	0.59	0.65	1.30	0.55	0.55	0.64
S ₆	0.33	0.24	0.26	0.53	0.22	0.22	0.26
R	2.5-9.5	3.5-8.0	1.5-7.5	1.0-7.5	1.0-5.0	1.0-4.0	1.0-5.0
P:							
25%	5.59	5.05	4.50	3.16	2.87	2.00	3.33
50%	6.13	5.46	4.89	4.44	3.26	2.42	3.70
75%	6.64	5.90	5.19	5.06	3.60	2.82	4.13

YELLOW							
—	Sockeye	Blueback	Coho	Spring	Pink	Chum	Steelhead
N	5,046	661	4,308	1,194	2,937	4,371	187
M	4.20	3.61	3.36	3.13	2.71	2.68	2.86
S	0.68	0.58	0.50	0.73	0.38	0.37	0.44
S ₆	0.28	0.24	0.20	0.30	0.16	0.15	0.18
R	2.0-7.0	2.5-5.0	2.0-5.0	1.5-5.5	1.5-4.0	1.5-4.0	1.5-4.5
P:							
25%	3.73	3.16	2.97	2.60	2.42	2.41	2.56
50%	4.24	3.58	3.23	3.09	2.69	2.66	2.89
75%	4.64	4.06	3.69	3.66	3.01	2.98	3.15

N=Total number of cans examined; M=Average colour (arithmetic mean) in Lovibond colour units; S=Standard deviation of distribution of single tins; S₆=Standard deviation of average of 6 tins; R=Range in Lovibond colour units; P=Percentiles.

TABLE V.—SUMMARY OF DISTRIBUTIONS OF TOTAL FREE OIL IN SAMPLES OF 12 TINS DRAWN FROM PARCELS OF CANNED SALMON INSPECTED BETWEEN JUNE 1, 1938 AND MAY 31, 1939.

ONE-POUND TALLS							
—	Sockeye	Blueback	Coho	Spring	Pink	Chum	Steelhead
N.....	155	47	316	59	288	437	5
M.....	76.3	45.2	51.9	138.8	41.7	13.0	221.0
S ₁₂	41.8	19.0	36.1	51.4	25.1	10.9	.....
R.....	2.5-202.5	12.5-102.5	2.5-162.5	47.5-287.5	2.5-152.5	0-52.5	170-280
P:							
25%.....	39.5	33.6	21.9	101.1	21.4	4.6	.....
50%.....	73.4	40.9	43.5	130.8	38.8	10.0	.....
75%.....	103.9	53.0	76.2	176.8	57.8	18.6	.....

ONE-HALF POUND FLATS							
—	Sockeye	Blueback	Coho	Spring	Pink	Chum	Steelhead
N.....	380	36	258	60	139	211	7
M.....	41.4	16.1	25.4	67.2	27.5	8.8	104.3
S ₁₂	20.4	8.2	16.1	26.8	14.8	6.2	.....
R.....	0-112.5	2.5-42.5	0-92.5	17.5-137.5	0-72.5	0-42.5	80-150
P:							
25%.....	26.4	10.2	13.7	47.5	17.0	3.8	.....
50%.....	39.5	13.6	21.6	67.5	26.8	7.8	.....
75%.....	52.5	19.5	32.2	85.5	36.8	12.0	.....

N=Number of samples of 12 examined; M=Average volume of free oil in 12 tins (c.c.); S₁₂=Standard deviation of free oil in 12 tins; R=Range in volume of free oil in 12 tins (c.c.); P=Percentiles. 16.4 c.c. (cubic centimeters)=1 cubic inch.

TABLE VI.—COMPARISON OF AVERAGE TOTAL FREE OIL (C.C.) IN SAMPLES OF 12 ONE-POUND TALL TINS INSPECTED DURING THE 1936, 1937 AND 1938 SEASONS

—	Sockeye	Blueback	Coho	Spring	Pink	Chum
1936.....	84.8	26.3	39.7	97.0	28.6	8.0
1937.....	53.8	31.8	34.7	102.3	49.0	10.4
1938.....	76.3	45.2	51.9	138.8	41.7	13.0

TABLE VII.—SUMMARY OF DISTRIBUTIONS OF TOTAL FREE AQUEOUS LIQUOR IN SAMPLES OF 12 TINS DRAWN FROM PARCELS OF CANNED SALMON INSPECTED BETWEEN JUNE 1, 1938 AND MAY 31, 1939.

ONE-POUND TALLS							
—	Sockeye	Blueback	Coho	Spring	Pink	Chum	Steelhead
N.....	155	47	316	59	288	437	5
M.....	860.1	1,008.0	874.2	803.8	958.1	1,023.4	628.0
S ₁₂	140.3	75.0	93.2	106.5	124.0	111.8	.....
R.....	542-1,322	787-1,117	647-1,297	567-1,047	557-1,467	752-1,452	550-710
P:							
25%.....	769.6	970.3	813.5	725.8	873.4	941.8	.....
50%.....	831.2	1,024.5	867.5	818.8	954.0	1,018.3	.....
75%.....	910.0	1,065.0	924.5	866.1	1,026.8	1,094.4	.....

ONE-HALF-POUND FLATS							
—	Sockeye	Blueback	Coho	Spring	Pink	Chum	Steelhead
N.....	380	36	258	60	139	211	7
M.....	397.1	467.5	412.7	403.8	441.3	488.4	331.4
S ₁₂	61.5	33.0	53.9	72.0	67.9	62.8	.....
R.....	227-677	337-537	237-627	252-652	237-687	332-652	240-420
P:							
25%.....	360.8	450.8	375.9	359.2	400.8	440.9	.....
50%.....	391.0	472.0	413.3	407.2	435.3	487.0	.....
75%.....	421.0	489.5	446.7	441.4	485.0	534.1	.....

N=Number of samples of 12 examined; M=Average volume of free aqueous liquor in 12 tins (c.c.); S₁₂=Standard deviation of free aqueous liquor in 12 tins; R=Range in volume of free aqueous liquor in 12 tins (c.c.); P=Percentiles. 16.4 c.c. (cubic centimeters)=1 cubic inch.

TABLE VIII.—FRESHNESS OF SAMPLES OF CANNED SALMON DRAWN FROM PARCELS PACKED BETWEEN JUNE 1, 1938 AND MAY 31, 1939

—	Sockeye	Blueback	Coho	Spring	Pink	Chum	Steelhead
%F.....	99.70	99.48	99.71	99.95	99.38	99.48	100.00
%Q.....	.28	.44	.24	.05	.55	.42	.....
%S.....	.02	.06	.04	.....	.06	.09	.....
%T.....	.....	.02	.01	.....	.01	.01	.....

%F=Percentage fresh tins; %Q=Percentage questionable tins; %S=Percentage stales tins; %T=Percentage tainted tins.

APPENDIX No. 6

FINANCIAL STATEMENT DEPARTMENT OF FISHERIES 1939-40

Vote No.	Appropriations	Amount	Expenditure
72	Salaries and Disbursements of Fishery Officers and Guardians.....	1,002,340 00	537,915 86
	Fisheries Patrol Service.....		239,908 42
	Fisheries Protection Service.....		113,612 63
			891,436 91
73	Building Fishways and Clearing Rivers.....	9,000 00	2,851 90
74	Development of Deep Sea Fisheries and the Demand for Fish.....	62,240 00	56,466 71
75	Fish Culture.....	241,640 00	224,918 62
76	Oyster Culture.....	24,105 00	21,369 86
77 and Supp. 610	Fisheries Research Board of Canada	245,000 00	238,444 12
78	International Fisheries Commission (Halibut).....	25,000 00	24,707 68
79 and Supp. 611	International Pacific Salmon Fisheries Commission.....	35,000 00	34,734 95
80	Grant to Fisheries Exhibitions.....	2,300 00	1,800 00
81	Grant to United Maritime Fisherman's Association....	3,000 00	3,000 00
82	To provide for the payment of a bounty for the destruction of Harbour Seals.....	30,000 00	17,662 50
Supp. 611A	To provide for contribution to the International Commission for the Assistance of Child Refugees in Spain.....	10,000 00	9,316 00
Supp. 612	To provide for Assisting the Salt Fish Branch of the Fishing Industry.....	800,000 00	494,895 46
70	Unforeseen Expenses—		
	Duties, etc., <i>re</i> Pelagic Seal Skins.....	6,111 86	6,111 86
	Fisheries Advisory Board.....	736 02	736 02
Statute	Fishing Bounty.....	159,993 85	159,993 85
Statute	Exchequer Court Awards— <i>re</i> land at Grafton Lakes, N.S., for rearing ponds.....	6,769 85	6,769 85
		2,663,236 58	2,195,216 29
71	Departmental Administration.....	125,520 00	112,680 09
Statute	Minister's Salary and Car Allowance.....	12,000 00	12,000 00
		2,800,756 58	2,319,896 38
Special Supp. 503	To enable aiding Fishermen, Groups of Fishermen and others to establish or better establish themselves in the Industry.....	500,000 00	473,474 48
Supp. 504	To aid in Expanding the sale of the products of the Canadian Fishermen in Foreign and Domestic Markets....	185,000 00	184,066 17
Supp. 505	To provide for the Extension of Educational work in co-operative producing and selling among fishermen....	50,000 00	46,084 10
		3,535,756 58	3,023,521 13
*	(Pacific Halibut Treaty Special Account (Finance Department).....		9,489 21
	Pacific Salmon Treaty Special Account (Finance Department).....		6,256 14
			3,039,266 48

* Balance due by United States Government on account of divisible expenditure for the fiscal year 1939-40.

FISHERIES

STATEMENT OF REVENUE RECEIVED DURING THE FISCAL YEAR 1939-40

Class	Total	Gen. Acct.	N.S.	P.E.I.	N.B.	Que.	B.C.	Yukon
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Fisheries Revenue.....	53,442 02	.....	10,361 74	2,934 06	10,459 00	222 75	29,089 47	375 00
Fines and Forfeitures..	11,991 08	.....	567 95	140 00	759 65	.....	10,523 48	.....
Casual Revenue.....	8,413 09	592 64	320 76	6,440 22	386 17	180 10	493 20	.....
Fish Culture Revenue..	443 00	37 50	252 50	28 00	125 00	.....	.....	.....
Modus Vivendi.....	272 00	.....	70 00	.....	.....	.....	202 00	.....
Pelagic Sealing.....	74,025 84	74,025 84	.....	.....	.....	.....	.....	.....
Premium, Discount and Exchange.....	33	.....	.....	33	.....	.....	.....	.....
	148,587 36	74,655 98	11,572 95	9,542 61	11,729 82	402 85	40,308 15	375 00

OTTAWA, July 11, 1940.

DEPARTMENT OF FISHERIES

SALARIES AND DISBURSEMENTS OF FISHERY OFFICERS—EXPENDITURE
AND SUMMARY, 1939-40

<i>Nova Scotia—</i>	
Head Office.....	\$ 24,547 63
District No. 1.....	42,100 09
District No. 2.....	54,902 16
District No. 3.....	59,724 14
	<hr/> \$ 181,274 02

<i>Prince Edward Island—</i>	
District No. 1.....	\$ 30,253 34
District No. 2 (Magdalen Islands, Que.).....	6,335 11
	<hr/> 36,588 45

<i>New Brunswick—</i>	
District No. 1.....	\$ 28,624 42
District No. 2.....	63,701 60
District No. 3.....	37,505 34
	<hr/> 129,831 36

<i>General East</i>	14,122 93
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<i>British Columbia—</i>	
Head Office.....	\$ 28,270 60
District No. 1.....	32,464 17
District No. 2.....	40,267 29
District No. 3.....	47,043 31
<i>Salmon Trap Net Commission</i>	8,904 29
<i>Canned Salmon Inspection</i>	11,602 12
<i>General West</i>	7,547 32
	<hr/> 176,099 10
	<hr/> \$ 537,915 86
	<hr/> <hr/>

SUMMARY

Nova Scotia.....	\$ 188,329 76
Prince Edward Island.....	31,743 42
New Brunswick.....	134,398 15
Quebec.....	7,345 43
British Columbia.....	176,099 10
	<hr/> \$ 537,915 86
	<hr/> <hr/>

FISHERIES PATROL SERVICE—EXPENDITURE AND SUMMARY FOR 1939-40

Nova Scotia—

District No. 1—		
Chartered Boats.....	\$	968 34
District No. 2—		
Departmental Boats.....	\$	11,433 50
Chartered Boats.....		3,896 89
		<u>15,330 39</u>
District No. 3—		
Departmental Boats.....	\$	17,678 66
Chartered Boats.....		1,200 00
		<u>18,878 66</u>
		<u>\$ 35,177 39</u>

Prince Edward Island—

District No. 1—		
Departmental Boats.....	\$	5,989 27
Chartered Boats.....		8,085 69
General Account.....		25 50
		<u>14,100 46</u>

New Brunswick—

District No. 1—		
Departmental Boats.....	\$	12,361 41
Chartered Boats.....		131 14
		<u>\$ 12,492 55</u>
District No. 2—		
Departmental Boats.....	\$	1,819 86
Chartered Boats.....		16,079 90
General Account.....		56 47
		<u>17,956 23</u>
		<u>30,448 78</u>

British Columbia—

District No. 1—		
Departmental Boats.....	\$	19,074 38
Chartered Boats.....		1,129 18
General Account.....		101 38
		<u>20,304 94</u>
District No. 2—		
Departmental Boats.....	\$	30,730 22
Chartered Boats.....		31,006 34
General Account.....		485 42
		<u>62,221 98</u>
District No. 3—		
Departmental Boats.....	\$	22,531 15
Chartered Boats.....		27,067 86
General Account.....		133 32
		<u>49,732 33</u>
Digby Island.....		5,817 41
Poplar Island.....		2,767 68
General—Small Boats.....		11 00
Air Service.....		19,326 45
		<u>27,922 54</u>
		<u>160,181 79</u>
		<u>\$ 239,908 42</u>

SUMMARY

Nova Scotia.....	\$	35,177 39
Prince Edward Island.....		14,100 46
New Brunswick.....		30,448 78
British Columbia.....		160,181 79
		<u>\$ 239,908 42</u>

FISHERIES PROTECTION SERVICE—EXPENDITURE SUMMARY FOR 1939-40

East Coast.....	\$	47,417 10
West Coast.....		66,195 53
		<u>\$ 113,612 63</u>

FISH CULTURE—EXPENDITURE AND SUMMARY FOR 1939-40

	Con- struction	Mainte- nance and Operation	Total by Hatcheries	Total by Provinces
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
GENERAL				
Administration.....		13,054 96		13,054 96
NOVA SCOTIA				
Antigonish.....	10,097 21	16,104 39	26,201 60	
Bedford.....		5,281 00	5,281 00	
Cobequid.....	1,262 24	11,185 80	12,448 04	
Coldbrook Pond.....		3,342 49	3,342 49	
Grand Lake Pond.....	2,636 93	5,980 07	8,617 00	
Kejimikujik.....	3,122 52	6,901 21	10,023 73	
Lindloff.....		5,932 33	5,932 33	
Margaree.....	508 85	14,268 64	14,777 49	
Margaree Pond.....		2,576 68	2,576 68	
Mersey River.....	3,314 31	1,050 76	4,365 07	
Middleton.....	2,025 00	9,895 18	11,920 18	
Nictaux Pond.....		424 51	424 51	
River Philip Pond.....		1,235 41	1,235 41	
Sackville Pond.....		121 01	121 01	
Yarmouth.....		8,441 40	8,441 40	
	22,967 06	92,740 88		115,707 94
PRINCE EDWARD ISLAND				
Cardigan Pond.....	241 69	5,006 55	5,248 24	
Kelly's Pond.....		3,720 94	3,720 94	
Morrell Pond.....		549 32	549 32	
	241 69	9,276 81		9,518 50
NEW BRUNSWICK				
Charlo.....	9,637 44	8,066 50	17,703 94	
Florenceville.....		9,182 69	9,182 69	
Grand Falls.....	48 50	7,576 79	7,625 29	
Miramichi.....	158 56	7,215 79	7,374 35	
Miramichi Pond.....		1,193 30	1,193 30	
New Mills Pond.....		4,777 09	4,777 09	
Saint John.....	3,734 32	11,133 32	14,867 64	
Saint John Pond.....		3,674 89	3,674 89	
	13,578 82	52,820 37		66,399 19
Supervisors, Engineers and Staff—East.....				14,357 96
General Account—East—				
Chamcook Lakes, N.B.....		202 02	202 02	
Miscellaneous.....		4,739 41	4,739 41	
				4,941 43
BRITISH COLUMBIA				
General Account.....				938 64
				224,918 62

SUMMARY

General Account.....	\$ 13,054 96
Nova Scotia.....	125,729 58
Prince Edward Island.....	11,157 18
New Brunswick.....	74,038 26
British Columbia.....	938 64
	<u>\$ 224,918 62</u>

DEVELOPMENT OF THE DEEP SEA FISHERIES AND THE DEMAND FOR FISH

EXPENDITURE 1939-40

Aids in expanding Demands for Fish.....	\$ 16,386 04
Educational Work.....	9,096 15
Miscellaneous.....	3,048 99
Subsidy Bait Collection Service.....	5,124 71
Subsidy for Bait Freezers.....	6,369 70
Fisheries Intelligence Bureau.....	2,947 35
Advertising.....	6,121 97
Shrimp Fishing Experiment.....	511 91
Destruction of Sea Lions.....	158 77
Transshipment of Fur Seal Skins.....	289 56
Fish Collection Service.....	3,775 83
London Conference <i>re</i> Salt Cod Fish.....	2,635 73
	<hr/>
	\$ 56,466 71

FISHERIES RESEARCH BOARD OF CANADA—EXPENDITURE 1939-40

Atlantic Biological Station, St. Andrews, N.B.....	\$ 56,200 97
Pacific Biological Station, Nanaimo, B.C.....	61,332 31
Atlantic Experimental Station, Halifax, N.S.....	42,932 71
Gaspé Experimental Station, Grand River, Que.....	17,576 44
Pacific Experimental Station, Prince Rupert, B.C.....	40,372 25
Administration and General Fund.....	\$ 20,719 09
Less Miscellaneous Revenue Receipts.....	689 65
	<hr/>
	20,029 44
	<hr/>
	238,444 12
	<hr/>

DEPARTMENT OF FISHERIES

FISHERIES EXPENDITURE 1939-40 BY PROVINCES

Appropriation	General	Nova Scotia	Prince Edward Island	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Salaries and Disbursements of Fishery Officers and Guardsmen		188,329 76	31,743 12	134,398 15	7,345 48					176,009 10	537,915 86
Fisheries Patrol Service		32,177 39	14,100 36	30,448 78						160,181 79	232,908 42
Fisheries Protection		42,973 36	4,369 24	374 30						113,012 63	113,012 63
Building Fishways and Clearing Rivers		1,043 35		229 68						1,578 87	2,851 90
Development of the Deep Sea Fisheries and the Development for Fish		12,484 78	10,470 30	8,391 43	3,275 37	5,899 27	1,025 47	1,379 61	1,664 32	3,260 35	56,456 71
Fish Culture		13,064 95	125,726 28	11,157 18						938 64	224,018 02
Oyster Culture		381 85	7,307 07	13,596 79							21,309 86
Fisheries Research Board		20,029 44	42,932 71	56,200 97	17,276 44					101,704 56	238,444 12
International Halibut Commission										24,707 68	24,707 68
International Pacific Salmon Fisheries Commission										34,734 95	34,734 95
Grant to Fisheries Exhibition		1,800 00									1,800 00
Grant to U.M.F. Association		1,000 00	1,000 00	1,000 00							3,000 00
To provide for the payment of a bounty for the destruction of Harbour Seals		5,002 50	2,510 00	1,285 00							17,662 50
To Commission for the Assistance of Child Refugees in Spain		9,316 00									9,316 00
To provide for assisting the Salt Fish Branch of the Fishing Industry		27,020 67	13,576 71	35,343 18	122,938 86	19,957 66					494,805 46
Duties, etc., Pelagic Seal skins		6,111 86									6,111 86
Fishing Bounty		739 02									739 02
Extinguished Court Awards			13,926 45	19,972 95	47,883 65						159,983 85
Expendable aiding fishermen, groups of fishermen and others to establish themselves in the industry			6,769 85								6,769 85
To aid in expending the sale of the products of the Canadian Fishermen in Foreign and Domestic Markets											
To provide for the extension of educational work in co-operative producing and selling among fishermen											
	4,000 00		50,000 00	109,280 23	154,097 35						473,474 48
		160,096 90									184,066 17
						180,066 17					
										3,634 39	46,084 10
		16,252 53	4,636 42	14,401 69	7,189 07						2,898,841 04
	93,135 58	993,834 98	168,948 10	485,733 85	360,308 17	205,914 10	1,023 47	1,379 61	1,664 32	581,900 86	112,680 09
Departmental Administration											12,000 00
Minister of Fisheries, Salary and Car Allowance											
											3,023,521 13
*Special Account Halibut (Finance Dept.)											9,489 21
*Special Account Salmon (Finance Dept.)											6,256 14
											3,039,266 48

NOTE.—(*) Balances due by the United States Government on divisible expenses at the close of the fiscal year 1939-40.

STATEMENT SHOWING THE ANNUAL EXPENDITURE OF THE DOMINION GOVERNMENT ON
ACCOUNT OF FISHERIES SERVICE SINCE CONFEDERATION

Year	Fish Inspection, etc.	Fish Culture	Fisheries Research Board	Dev.D.S. Fish, etc.	Fishing Bounty	Sundry Services	Total
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
To June 30/67	27,043 97					9,763 40	36,807 37
1867-68	32,752 48	800 89				7,550 51	41,103 88
1868-69	32,802 60					192 24	33,001 84
1869-70	74,163 43	3,074 47				58 00	77,295 90
1870-71	77,388 84	4,375 32				80 02	81,844 18
1871-72	87,777 45	4,826 24				721 49	93,325 13
1872-73	90,517 28	7,360 92				4,400 00	102,278 20
1873-74	61,940 98	14,306 13				12,040 13	88,287 24
1874-75	48,584 95	17,999 73				3,190 97	69,775 65
1875-76	76,128 35	32,055 38				16,193 13	124,376 86
1876-77	72,527 25	24,037 73					96,564 98
1877-78	73,173 48	20,088 80				95,118 30	188,380 58
1878-79	62,430 32	19,888 75				12,389 05	94,708 12
1879-80	57,032 94	29,109 61				500 00	86,662 55
1880-81	109,579 91	21,530 62					131,110 53
1881-82	89,097 62	31,244 29				2,433 33	122,775 24
1882-83	92,820 25	25,776 87			172,285 47	28,418 63	319,301 22
1883-84	94,166 32	31,289 38			130,844 85	26,301 82	282,102 37
1884-85	107,537 35	43,879 82			155,718 98	41,613 50	348,749 65
1885-86	118,914 51	38,660 19			161,539 39	71,744 64	390,858 73
1886-87	224,133 47	37,821 96			160,903 59	22,902 77	445,761 49
1887-88	190,255 40	41,082 04			163,757 92	50,405 09	445,500 45
1888-89	161,632 07	38,743 24		103 20	150,185 53	27,577 58	378,241 62
1889-90	137,192 33	38,278 95		197 82	158,526 54	32,218 72	366,414 37
1890-91	160,269 18	43,023 81		1,548 89	158,241 01	26,521 00	389,064 55
1891-92	171,066 94	42,967 97		2,266 74	156,891 85	32,900 20	406,092 92
1892-93	191,289 71	47,339 04		1,791 47	159,752 14	83,163 60	483,335 96
1893-94	208,068 38	45,024 67		2,624 73	158,234 10	83,961 02	497,913 80
1894-95	207,476 76	39,720 76		2,648 63	160,066 80	34,482 83	444,395 83
1895-96	211,466 14	38,095 95		3,053 63	163,567 99	13,403 21	429,556 93
1896-97	215,063 64	27,330 73		2,925 82	154,389 77	43,876 89	443,586 85
1897-98	200,493 77	28,002 32		2,305 73	157,504 00	53,514 83	441,820 65
1898-99	203,356 36	34,522 57	4,709 10	2,936 20	159,459 00	12,093 75	417,076 98
1899-1900	185,813 31	39,370 12	739 61	13,263 99	160,000 00	45,654 69	444,841 72
1900-01	239,441 08	68,961 40	1,990 58	15,160 83	158,802 50	9,984 96	494,341 35
1901-02	265,185 22	79,891 53	3,481 00	14,820 41	155,942 00	32,178 33	551,498 81
1902-03	266,595 61	77,330 86	3,495 95	13,991 93	159,835 50	9,851 10	531,118 95
1903-04	314,933 70	109,287 07	4,496 54	27,385 08	158,943 70	22,867 46	637,315 55
1904-05	571,787 63	149,419 24	2,825 50	51,723 32	157,228 24	49,148 98	982,132 91
1905-06	409,373 74	209,376 28	5,024 42	87,479 71	158,546 65	107,388 32	977,389 12
1906-07	303,620 12	118,681 62	2,506 84	50,312 38	150,015 75	60,995 98	695,222 69
1907-08	404,568 55	244,455 95	15,829 30	47,852 71	156,113 50	123,574 80	992,698 82
1908-09	464,031 87	190,563 19	21,599 70	40,167 36	159,999 90	126,966 50	1,003,328 52
1909-10	689,557 42	180,545 65	14,386 79	55,935 64	155,221 85	101,486 31	1,197,133 66
1910-11	456,693 79	250,727 66	9,703 43	62,006 44	159,166 75	320,778 96	1,229,074 03
1911-12	551,900 64	235,699 52	16,997 44	57,870 64	159,999 70	120,614 83	1,123,082 77
1912-13	661,326 46	283,793 43	21,000 00	73,625 25	159,996 40	59,259 84	1,259,001 38
1913-14	1,072,683 45	354,675 13	16,972 47	99,825 27	158,661 25	177,078 43	1,879,896 00
1914-15	757,379 35	370,093 17	20,994 69	77,976 18	159,584 14	218,884 93	1,614,912 46
1915-16	618,489 44	275,079 38	24,649 33	94,077 74	158,741 05	140,262 91	1,311,299 85
1916-17	548,130 80	275,166 53	26,018 15	83,920 17	159,999 80	79,297 81	1,172,532 76
1917-18	612,624 42	270,796 95	25,508 72	104,398 21	159,893 10	93,429 70	1,266,651 10
1918-19	566,453 63	255,761 60	23,294 62	108,133 86	159,675 25	37,972 45	1,151,291 41
1919-20	945,491 82	328,332 33	27,729 74	80,391 38	155,156 70	67,479 65	1,541,422 35
1920-21	1,227,664 78	422,761 60	26,973 13	16,893 28	152,519 30	83,036 34	1,929,848 43
1921-22	1,074,455 10	390,965 47	43,806 34	19,948 63	159,449 80	177,660 30	1,806,286 64
1922-23	839,536 66	353,625 51	44,618 54	13,056 01	157,172 55	178,202 17	1,589,211 44
1923-24	838,628 64	369,376 79	46,956 09	20,822 49	159,916 80	175,498 93	1,611,209 74
1924-25	794,499 76	357,006 64	46,649 29	30,233 21	159,826 49	152,879 14	1,541,094 44
1925-26	791,865 76	342,836 72	105,440 58	5,291 83	159,984 80	160,399 85	1,565,819 54
1926-27	820,341 66	257,645 44	123,455 26	6,459 71	159,768 10	179,130 24	1,546,800 41
1927-28	913,004 67	353,360 62	137,732 52	63,538 78	158,375 80	208,081 99	1,894,094 48
1928-29	965,126 65	434,471 58	191,941 45	95,517 66	151,411 20	262,594 14	2,092,062 63
1929-30	1,163,349 00	361,165 09	285,956 53	111,034 51	159,749 35	279,555 56	2,360,810 04
1930-31	1,176,613 73	322,558 01	380,383 83	189,678 94	159,773 55	286,647 00	2,521,083 06
1931-32	970,669 66	271,159 98	275,665 97	102,025 64	159,432 30	290,115 49	2,069,069 04
1932-33	858,612 55	251,035 78	228,062 63	84,766 31	159,780 65	260,716 37	1,822,974 29
1933-34	842,672 48	205,934 00	176,239 67	54,191 84	159,311 35	159,520 01	1,597,869 35
1934-35	874,067 81	211,021 99	178,745 09	63,068 59	159,976 25	155,634 07	1,642,513 80
1935-36	916,763 86	231,036 57	194,872 26	39,128 15	159,986 20	172,246 05	1,714,013 09
1936-37	885,973 76	214,528 63	198,435 60	48,030 43	159,977 75	530,363 15	2,027,314 32
1937-38	934,243 13	218,055 35	231,836 17	50,065 27	189,857 25	558,990 78	2,153,047 95
1938-39	1,107,126 66	235,408 21	239,877 49	54,059 29	159,982 70	773,989 87	2,568,443 72
1939-40	891,436 91	224,918 02	238,444 12	56,466 71	159,993 85	1,452,260 92	3,023,521 13
	33,740,718 01	11,217,373 93	33,696,143 48	2,407,998 59	9,188,116 61	9,412,417 97	69,662,766 59

STATEMENT SHOWING THE REVENUE COLLECTED ANNUALLY BY THE DOMINION
GOVERNMENT ON ACCOUNT OF THE FISHERIES SERVICE SINCE
CONFEDERATION

Year	Fish. Rev. and Fines and Forf.	Casual Revenue	Pelagic Sealing Revenue	Sundry Revenues	Total
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
To June 30/67.....	10,490 90				10,490 90
1867-68.....	19,556 97				19,556 97
1868-69.....	13,583 97				13,583 97
1869-70.....	16,622 43				16,622 43
1870-71.....	12,408 97				12,408 97
1871-72.....	10,498 00				10,498 00
1872-73.....	10,338 24				10,338 24
1873-74.....	14,012 83				14,012 83
1874-75.....	14,764 20				14,764 20
1875-76.....	13,571 12				13,571 12
1876-77.....	13,364 85				13,364 85
1877-78.....	14,113 11				14,113 11
1878-79.....	17,738 34	(Halifax	Fisheries A ward)— (\$4,490,882.64)		4,508,620 98
1879-80.....	19,423 16				19,423 16
1880-81.....	24,596 94				24,596 94
1881-82.....	23,687 45				23,687 45
1882-83.....	21,337 16				21,337 16
1883-84.....	20,006 50				20,006 50
1884-85.....	26,627 86				26,627 86
1885-86.....	26,088 50				26,088 50
1886-87.....	25,947 53				25,947 53
1887-88.....	42,931 12	414 97		2,067 00	45,413 09
1888-89.....	46,087 96	712 29		10,338 30	57,138 55
1889-90.....	56,956 83	296 05		12,686 50	69,939 38
1890-91.....	60,917 19	273 72		9,877 23	71,068 14
1891-92.....	49,541 39	437 78		13,244 50	63,223 67
1892-93.....	95,892 36	233 67		50,303 29	146,429 32
1893-94.....	73,352 59			6,249 00	79,601 59
1894-95.....	89,150 42			8,162 78	97,313 20
1895-96.....	88,822 66			5,408 34	94,231 00
1896-97.....	98,884 40	2,000 00		7,585 15	108,469 55
1897-98.....	106,179 59			6,923 91	113,103 50
1898-99.....	76,440 10			34,992 36	111,432 46
1899-1900.....	79,788 99			8,607 60	88,396 59
1900-01.....	78,966 61			9,178 50	88,145 11
1901-02.....	67,945 93			13,769 94	81,715 87
1902-03.....	69,710 42			8,925 40	78,635 82
1903-04.....	85,591 03			10,165 50	95,756 53
1904-05.....	80,316 14			11,083 70	91,399 84
1905-06.....	83,441 53			14,568 16	98,009 69
1906-07.....	53,010 25			4,134 00	57,144 25
1907-08.....	80,116 98			93,119 28	173,236 26
1908-09.....	72,901 56			9,794 70	82,696 26
1909-10.....	74,193 78			10,876 78	85,070 56
1910-11.....	85,785 08			15,076 50	100,861 58
1911-12.....	82,445 01			13,785 00	96,230 01
1912-13.....	92,962 69		200,000 00	13,500 00	306,462 69
1913-14.....	99,266 13			11,728 50	110,994 63
1914-15.....	92,757 02		20,000 00	8,878 75	121,635 77
1915-16.....	98,629 67		10,000 00	5,680 50	114,310 17
1916-17.....	96,376 26		10,000 00	9,912 00	116,288 26
1917-18.....	114,572 39		12,620 36	9,523 60	136,716 35
1918-19.....	123,114 29		962 31	8,592 64	132,669 24
1919-20.....	336,590 99	65,849 64	3,501 60	6,925 33	412,867 56
1920-21.....	297,797 49	7,362 44	185,748 07	37,856 48	528,764 48
1921-22.....	224,156 50	5,451 20	86,080 62	13,212 42	328,900 74
1922-23.....	290,624 32	5,183 15	59,876 83	7,137 60	362,821 90
1923-24.....	173,747 98	3,333 54	35,659 43	8,115 98	220,856 93
1924-25.....	144,505 26	2,903 17	28,752 91	2,137 60	178,298 94
1925-26.....	175,638 99	3,997 34	74,858 96	10,050 68	264,545 97
1926-27.....	185,295 85	3,662 10	35,788 54	633 05	225,379 54
1927-28.....	130,566 95	8,877 09	95,014 07	396 80	234,854 91
1928-29.....	123,473 65	8,128 11	73,236 35	1,316 24	206,154 35
1929-30.....	124,471 29	9,978 85	62,507 32	607 45	197,564 91
1930-31.....	85,140 24	13,730 43	37,163 78	900 64	136,935 09
1931-32.....	47,248 04	12,822 90	44,471 94	1,894 06	105,936 94
1932-33.....	8,392 32	14,132 17	2,609 16	3,212 43	28,346 08

STATEMENT SHOWING THE REVENUE COLLECTED ANNUALLY BY THE DOMINION
GOVERNMENT ON ACCOUNT OF THE FISHERIES SERVICE SINCE
CONFEDERATION—*Concluded*

Year	Fish. Rev. and Fines and Forf.	Casual Revenue	Pelagic Sealing Revenue	Sundry Revenues	Total
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
1933-34.....	52,134 18	26,039 22	52,466 26	1,941 98	132,581 64
1934-35.....	51,046 62	6,837 22	89,549 74	1,774 82	149,208 40
1935-36.....	48,859 07	4,681 69	113,594 61	727 23	167,862 60
1936-37.....	62,334 46	9,174 27	103,494 19	1,727 10	176,730 02
1937-38.....	68,065 25	6,075 50	45,262 51	420 60	119,823 86
1938-39.....	63,883 34	8,884 92	39,355 17	654 93	112,778 36
1939-40.....	65,433 10	8,413 09	74,025 84	715 33	148,587 36
	5,725,233 29	239,386 52	1,596,600 57	5,051,980 80	12,613,201 18

SUMMARY BY PROVINCES

General Account.....	\$ 6,335,643 56
Nova Scotia.....	783,538 45
New Brunswick.....	692,837 52
Prince Edward Island.....	163,297 30
Quebec.....	348,459 97
Ontario.....	534,927 56
Manitoba.....	335,474 08
Manitoba and North West Territories.....	7,416 45
North West Territories.....	9,003 23
Hudson Bay District.....	1,187 98
Saskatchewan.....	95,152 41
Alberta.....	234,497 16
British Columbia.....	3,054,598 76
Yukon.....	17,166 75
	<u>\$12,613,201 18</u>

APPENDIX No. 7

COMPARATIVE STATEMENT OF LOBSTER FISHING LICENCES
FROM 1928

PRINCE EDWARD ISLAND AND MAGDALEN ISLANDS

Year	Magdalen Islands	Prince County	Kings County	Queens County	Kings and Queens (Southern portion)	Totals
1928.....	682	925	616	337	.....	2,560
1929.....	659	857	509	271	.....	2,296
1930.....	644	922	573	285	.....	2,424
1931.....	526	894	521	283	.....	2,224
1932.....	526	1,409	308	402	398	3,043
1933.....	599	1,359	324	438	485	3,205
1934.....	825	1,190	483	459	542	3,499
1935.....	931	1,110	538	487	591	3,657
1936.....	984	972	580	536	609	3,681
1937.....	973	1,060	594	417	588	3,632
1938.....	767	1,035	539	396	551	3,288
1939.....	644	1,038	532	375	546	3,135

NOVA SCOTIA—DISTRICT No. 1

Year	Inverness County	Richmond County	Cape Breton County	Victoria County	Totals
1928.....	537	648	462	376	2,023
1929.....	501	636	435	329	1,901
1930.....	496	682	442	343	1,963
1931.....	473	745	458	367	2,043
1932.....	542	897	578	426	2,443
1933.....	656	1,092	773	534	3,055
1934.....	701	1,060	790	561	3,112
1935.....	738	1,026	691	503	2,958
1936.....	845	948	886	506	3,185
1937.....	796	1,028	784	473	3,081
1938.....	738	883	823	455	2,899
1939.....	697	962	741	429	2,829

NOVA SCOTIA—DISTRICT No. 2

Year	Halifax Office	Halifax County	Patrol Boat	Guys- boro County	Antig- onish County	aPictou and Col- chester	aCum- berland County	bHants, Col- chester and Cum- berland County	Totals
1928....	183	976	41	1,021	334	521	171	17	3,264
1929....	153	767	435	1,047	283	358	221	7	3,271
1930....	131	1,135	204	1,087	308	349	255	9	3,478
1931....	142	1,200	170	1,139	273	352	299	15	3,590
1932....	105	1,364	14	1,330	339	462	399	14	*4,029
1933....	68	1,453	59	1,439	350	526	374	18	4,287
1934....	20	1,342	24	1,489	425	589	431	22	4,342
1935....	5	1,435	24	1,473	494	685	426	7	4,549
1936....	1	1,460	.....	1,563	506	732	420	10	4,698
1937....	.....	1,429	.....	1,524	567	654	306	18	4,498
1938....	.....	1,345	.....	1,495	461	655	380	14	4,350
1939....	.....	1,459	1	1,421	411	590	323	18	4,223

a Northumberland Straits side.

b Bay of Fundy side.

* The 1932 total includes two licences issued by the District Supervisor.

NOVA SCOTIA—DISTRICT No. 3

Year	Lunen- burg	Queens	Shel- burne	Yar- mouth	Digby	Kings	Anna- polis	Totals
1928.....	563	329	966	827	470	25	119	3,299
1929.....	472	217	850	792	463	27	120	2,941
1930.....	504	250	854	768	483	28	135	3,022
1931.....	590	296	1,016	770	430	.....	128	3,230
1932.....	491	290	965	673	312	.....	148	2,879
1933.....	525	262	1,112	720	415	21	141	3,196
1934.....	481	287	1,014	705	354	24	114	2,979
1935.....	562	307	1,100	758	370	21	85	3,203
1936.....	550	304	1,058	831	368	23	90	3,224
1937.....	692	398	1,190	972	384	37	113	3,786
1938.....	617	298	1,128	1,135	438	32	104	3,752
1939.....	689	314	1,232	1,323	470	43	159	4,230

NEW BRUNSWICK—DISTRICT No. 1

Year	Charlotte	Saint John	Albert and West- morland	Totals
1928.....	433	86	1	520
1929.....	360	53	1	414
1930.....	288	57	2	347
1931.....	281	45	4	330
1932.....	380	101	2	483
1933.....	271	99	1	371
1934.....	*299	94	1	394
1935.....	*362	87	1	450
1936.....	408	85	1	494
1937.....	380	81	2	463
1938.....	95	71	6	172
1939.....	323	46	11	380

NEW BRUNSWICK—DISTRICT No. 2

Year	Northum- berland County	Resti- gouche County	Gloucester County	Kent County	West- morland County	Totals
1928.....	297	50	517	501	249	*1,981
1929.....	289	43	406	583	188	*1,834
1930.....	319	46	794	638	327	2,124
1931.....	300	54	647	765	326	2,192
1932.....	394	67	933	997	435	2,826
1933.....	407	77	1,041	989	720	3,234
1934.....	512	74	1,064	1,087	905	3,642
1935.....	509	80	986	1,035	719	3,329
1936.....	503	73	1,091	1,033	619	3,269
1937.....	526	60	1,084	1,008	696	3,774
1938.....	523	54	1,084	1,015	708	3,384
1939.....	528	55	1,072	903	671	3,229

* The 1928 total includes 367 licences issued by the District Supervisor, the 1929 total 325 licences, the 1934, 3 licences, and 1935 1 licence, so issued.

NOTE.—Cancelled licences are not included in the figures in this appendix.

APPENDIX No. 8

The following is a statement of the various kinds of licences issued by the supervisors in their respective districts, during the 1939-40 season:—

MAGDALEN ISLANDS, QUEBEC—Acting Supervisor J. J. Larabee

Kind of licences	Number of licences issued
Lobster fishing	644
Certificates of identification—Nil	
Licences to can lobsters	9
Certificates under section 53—Nil	
Herring seine	20
Herring trap-net	21 (5 cod trap-nets)
Smelt gill-net	75
Smelt bag-net or box-net	2
	<hr/> 771

PRINCE EDWARD ISLAND—Acting Supervisor J. J. Larabee

Kind of licences	Number of licences issued
Lobster fishing	2,492 (1 cancelled)
Certificates of identification—40	
Licences to can lobsters	60
Oyster fishery	30
Quahaug fishery	84
Certificates under section 53—4	
Trap-net fishing	2
Salmon trap-net or pound-net	2
Set salmon gill-net	8
Gaspereau gill-net permits	9
Special oyster permits (contaminated areas)	137
Scallop fishery	Nil
Certificates under section 24 of the regulations governing the inspection of canned fish and shellfish, etc.—756 (1 cancelled)	
Smelt gill-net	164
Smelt bag-net or box-net	213
	<hr/> 3,201 (1 cancelled)

NOVA SCOTIA—DISTRICT No. 1—Supervisor Wm. McAulay

Kind of licences	Number of licences issued
Lobster fishing	2,829
Certificates of identification—2	
Licences to can lobsters	24
Oyster fishery	132
Certificates under section 3—152	
Trap-net fishing	38
Salmon trap-net, pound-net or weir	234
Special angling permits	166 (2 cancelled)
Set salmon gill-net	61
Certificates under section 24 of the regulations governing the inspection of canned fish and shellfish, etc.—20	
Smelt bag-net or box-net	40
Smelt gill-net	116
	<hr/> 3,640 (2 cancelled)

NOVA SCOTIA—DISTRICT No. 2—Supervisor E. D. Fraser

Kind of licences	Number of licences issued
Lobster fishing	4,223 (1 cancelled)
Certificates of identification—150 (5 cancelled)	
Licences to can lobsters	32
Oyster fishery	241
Quahaug fishery	38
Certificates under section 53—87	
Lobster pound	4
Seine	127
Herring weir	31
Trap-net fishing	88
Salmon drift-net	51
Salmon trap-net, pound-net or weir	194

King of licences	Number of licences issued
Special angling permits	189 (16 complimentary and
Set salmon gill-net	342 1 spoiled)
Permits to catch smelts by use of a dip-net	746
Shad gill-net or drift-net	74
Special oyster permits (contaminated areas)	26
Scallop fishery	Nil
Small dragger	1
Licences to a captain of a Canadian fishing vessel (using an otter or other trawl)	3
Certificates under section 24 of the regulations governing the inspection of canned fish and shellfish, etc.—131	
Smelt bag-net or box-net	208
Smelt gill-net	168
Lobster pound certificates—142	
Interim receipts	Nil
	<hr/> 6,786 (1 cancelled, 16 complimentary, 1 spoiled)

NOVA SCOTIA—DISTRICT No. 3—Supervisor H. H. Marshall

King of licences	Number of licences issued
Lobster fishing	4,230
Certificates of identification—34	
Licences to can lobsters	Nil
Certificates under section 53—163 (1 spoiled)	
Lobster pound	8
Herring weir	52
Trap-net fishing	161
Salmon drift-net	3
Salmon trap-net, pound-net or weir	34
Salmon net permits (Medway river)	21
Special angling permits	507
Set salmon gill-net	294
Shad gill-net or drift-net	1
Salmon gill-net licences (Medway river estuary)	146 (48 cancelled)
Smelt dip-net fishing permits	175
Scallop fishery	56
Smelt bag-net or box-net	23
Smelt gill-net	49
Lobster pound certificates—757	
Permit for scientific purposes	1
	<hr/> 5,761 (48 cancelled)

NEW BRUNSWICK—DISTRICT No. 1—Supervisor J. F. Calder

King of licences	Number of licences issued
Lobster fishing	380
Certificates of identification—20	
Licences to can lobsters	1
Certificates under section 53—11	
Lobster pound	5
Herring weir	594
Clam permits	192
Salmon gill-net or drift-net	98
Herring seine	23
Shad gill-net or drift-net	37
Scallop fishery	21
Small dragger	1
Certificates under section 24 of the regulations governing the inspection of canned fish and shellfish, etc.	Nil
Smelt gill-net	Nil
Smelt bag-net or box-net	Nil
Lobster pound certificates—2,832	
Lease of Dark Harbour fishing privilege—1	
Lease of Beals Eddy Pond fishery—1	
	<hr/> 1,352

NEW BRUNSWICK—DISTRICT No. 2—Supervisor A. L. Barry

King of licences	Number of licences issued
Lobster fishing	3,251 (9 cancelled and 13 free)
Certificates of identification—93 (9 cancelled)	
Licences to can lobsters	70 (1 cancelled)
Oyster fishery	1,218 (4 free)

NEW BRUNSWICK—DISTRICT No. 2—Supervisor A. L. Barry—*Concluded*

Kind of licences	Number of licences issued
Quahaug fishery	64
Certificates under section 53—236	
Lobster pound	5
Gaspereau pound-net or trap-net	106
Salmon gill-net or drift-net	196 (4 cancelled)
Salmon trap-net, pound-net or weir	384
Special angling permits (black salmon)	29
Tomcod trap-net	10 (4 cod trap-nets)
Shad gill-net or drift-net	Nil
Permits authorizing the catching of pickerel, suckers, chub, perch and other coarsefish	8
Special oyster permits (contaminated areas)	2
Scallop fishery	Nil
Certificates under section 24 of the regulations governing the inspection of canned fish and shellfish, etc.—677 (5 cannot be located)	
Smelt gill-net	312
Smelt bag-net or box-net	6,278 (1 cancelled and 50 free)
Lobster pound certificates—814 (25 cannot be located)	
	11,933 (15 cancelled and 67 free)

NEW BRUNSWICK—DISTRICT No. 3—Supervisor L. H. Parks

Kind of licences	Number of licences issued
Sturgeon fishery	3
Whitefish fishery	Nil
Salmon net permits (St. John river)	75
Salmon gill-net or drift-net	117
Salmon trap-net, pound-net or weir	98
Special angling permits (black salmon)	1,123
Gaspereau gill-net	153
Shad dip-net fishing permits	79
Whitefish gill-net permits (Grand Lake-Chiputneticook System)	71
Shad gill-net or drift-net	198
Permits authorizing the catching of pickerel, suckers, chub, perch and other coarsefish	117
Pickercel permits (hook and line)	131
Bass fishery	24
Smelt bag-net or box-net	Nil
Interim receipts—19	
	2,189

PROVINCE OF BRITISH COLUMBIA—Chief Supervisor J. A. Motherwell

Kind of licences	Number of licences issued
Abalone fishery	8
Indian permits	1,932
Crab fishery	110
Smelt or sardine fishery	48
Miscellaneous	114 (2 cancelled)
Salmon fishery licences for gill-net or drift-net	5,205 (87 cancelled)
Salmon trolling	3,869 (9 cancelled)
Salmon trap-net	5
Salmon purse-seine	329 (1 cancelled)
Salmon drag-seine	9
Licences to a captain of a salmon purse-seine boat	203
Grayfish fishery	365
Licences to assistant operators of salmon (purse or drag) seine	1,834
Licences to assistants in a boat used in operating a salmon gill-net or drift-net	738 (56 cancelled)
Cod fishery	488 (16 cancelled)
Whaling	Nil
Licences to captain of a Canadian halibut or cod fishing boat, etc.	18
Small dragger licences to Inshore fishermen	47
Licences to a captain of a Tuna fishing boat	17
Licences to assistant operator on a Tuna fishing boat	78
Herring gill-net or drift-net	36
Herring purse-seine	58 (2 cancelled)
Pilchard purse-seine	28

PROVINCE OF BRITISH COLUMBIA—Chief Supervisor J. A. Motherwell—*Concluded*

Kind of licences	Number of licences issued
Licences to a captain of a herring purse-seine boat.....	43
Licences to a captain of a pilchard purse-seine boat....	26
Licences to assistant operators of herring purse-seines....	516
Licences to assistant operators of pilchard purse-seines..	168
Herring pound permits	13
Fur seal skin certificates—577 (1 lost)	
	<hr/> 16,305 (173 cancelled)

YUKON DISTRICT

Kind of licences	Number of licences issued
Special fishery	22

PACIFIC COAST

Kind of licences	Number of licences issued
Licences to United States halibut fishing vessels	195

ATLANTIC COAST

Kind of licences	Number of licences issued
Licences to United States fishing vessels	68

NORTHWEST TERRITORIES

Kind of licences	Number of licences issued
Special fishery	Nil
Reduction works	Nil
Walrus	24 (incomplete)
Special angling permits (Hudson Bay & James Bay)....	Nil
	<hr/> 24

JAMES BAY

Kind of licences	Number of licences issued
Experimental commercial fishing permit	1
Total	<hr/> 52,248 (240 cancelled, 16 complimentary, 67 free, 1 spoiled)

DOMINION OF CANADA

ELEVENTH
ANNUAL REPORT
OF THE
DEPARTMENT OF FISHERIES
SEVENTY-FOURTH ANNUAL FISHERIES
REPORT OF THE DOMINION

FOR THE YEAR
1940-41



OTTAWA
EDMOND CLOUTIER
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1941

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*To His Excellency Major-General the Right Honourable the Earl of Athlone,
K.G., P.C., G.C.B., G.M.M.G., G.C.V.O., D.S.O., A.D.C., Governor General
and Commander-in-Chief of the Dominion of Canada.*

MAY IT PLEASE YOUR EXCELLENCY:

I have the honour to submit herewith, for the information of Your Excellency and the Parliament of Canada, the Eleventh Annual Report of the Department of Fisheries, being the Seventy-fourth Annual Fisheries Report for the Dominion.

I have the honour to be,

Your Excellency's most obedient servant,

J. E. MICHAUD,
Minister of Fisheries.

DEPARTMENT OF FISHERIES,
OTTAWA, April 7, 1941.

DEPUTY MINISTER'S REPORT

To the Hon. J. E. MICHAUD, M.P.,
Minister of Fisheries.

SIR,—I have the honour to submit the eleventh Annual Report of the Department of Fisheries, which covers the fiscal year 1940-41. It is the seventy-fourth Annual Report on the fisheries of Canada. In addition to reference to results of commercial fishing operations in the Dominion in the calendar year 1940, it includes references to various subjects related to the work of the department and the fishing industry.

Appendices to the report give information in detail regarding a number of branches of departmental work and related activities for the year. Included in these appendices are:—

Reports of the Chief Supervisors of Fisheries.

Report on the Department's Fish Culture Work.

Report of the Fisheries Engineer.

Report on Oyster Culture.

Report on Canned Salmon Inspection and Preliminary Work on the Inspection of Canned Herring.

Departmental Financial Statement.

Statement showing the number of Lobster Fishing Licences issued for a period of years.

Statement showing the numbers and kinds of Fishing Licences issued during 1940-41.

REVIEW OF FISHERIES RESULTS FOR THE CALENDAR YEAR 1940

Total marketed value of Canada's commercial fisheries production in 1940 was \$45,118,757, or slightly more than \$5,000,000 above the total for 1939. From the standpoint of marketed value return the year was the most successful in the Dominion's fisheries since 1930. The landings of fish and shellfish during the year amounted nearly to 12,160,000 hundredweights, as compared with 10,645,900 hundredweights, roundly stated, in 1939. Sea fisheries catch, a little more than 11,368,100 hundredweights, was valued on the market at \$38,910,058 and the fresh water fish taken, about 791,740 hundredweights, was worth \$6,208,699. The fresh water fisheries showed an increase of only about \$105,000 in marketed value, as compared with 1939 value, but in the case of the sea fisheries the increase was almost \$4,938,000. In British Columbia there was a gain of slightly more than \$4,000,000 and an increase of about \$1,090,000 in the Nova Scotia returns. There was a gain of some \$300,000 in Manitoba and there were small gains in Ontario, Alberta and the Yukon Territory. Elsewhere marketed value decreased, though nowhere very greatly.

Major Fisheries.—The salmon fishery continues to hold first place in 1940 although the catch, slightly less than 1,458,000 hundredweights, showed a decrease of approximately 44,000 hundredweights from the landings of 1939. Notwithstanding reduction in catch, there was an increase of more than three-quarters of a million dollars in the marketed value return from the fishery. The

value of the 1940 catch on the market was \$14,168,000 roundly stated. Although salmon are taken on both coasts of the Dominion the big catch is always from British Columbia waters. The Pacific coast landings during the year were 1,431,900 hundredweights with a marketed value of nearly \$13,757,100; on the catch side there was a decrease of about 44,500 hundredweights but the value increased by more than \$762,000. In the Atlantic area landings were a little more than 26,000 hundredweights, about 800 hundredweights more than in the preceding year but the marketed value \$410,900 showed a small decrease.

In some years prior to 1940 the lobster fishery had ranked second only to the salmon fishery in importance, rated according to marketed value return. In 1940, however, both the herring and cod fisheries went ahead of the lobster fishery. The value of the lobster catch on the market, using round figures as in most cases in this review, was \$3,187,600—a decrease of about \$595,000 from the 1939 total—but the herring production exceeded in value \$6,058,600 and the cod catch was worth \$4,984,500. In the case of herring the increase on the value side, as compared with the 1939 total, was \$2,544,000. The gain was almost wholly due to the great expansion of herring canning operations in British Columbia where, in order to help Great Britain in maintaining wartime food stocks, the herring industry has been enormously expanded since the outbreak of hostilities.

The Atlantic coast landings of herring increased by a little more than 100,000 hundredweights but in British Columbia there was a catch of 3,395,000 hundredweights or an increase of about 1,230,200 hundredweights. The total catch of herring on the two coasts was 4,650,300 hundredweights. The cod catch amounted to 1,932,900 hundredweights, all of it save 16,600 hundredweights taken in the Atlantic waters, and its marketed value was, as already stated, \$4,984,500. On the catch side there was an increase of nearly 300,000 hundredweights and in the case of marketed value the gain was \$1,750,000.

Whitefish continued in first place among the fresh-water species so far as value and catch was concerned. The landings of whitefish, 168,200 hundredweights, were several thousand hundredweights greater than they had been in 1939 and this production gain, plus firmer prices, brought the marketed value to more than \$1,928,800 or \$206,500 above the preceding year's figures. In addition to the fisheries already named several others yielded catches in 1940 which were worth more than a million dollars on the market. Among those in this group were the sardine fishery (\$1,884,200); the halibut fishery (\$1,859,300); and the haddock fishery (\$1,443,700).

Details of statistics relating to 1940 fisheries operations will be found, of course, in the statistical report bearing the title, "Fisheries Statistics of Canada, 1940".

Capital Investment and Employment.—Plants and equipment, boats, vessels and gear in use in the fisheries during 1940 represented a capital investment of slightly less than \$49,478,000, or about \$2,154,000 more than in 1939. Investment was greater than in any year since 1930. The total number of persons employed in the fishing industry during the year exceeded 83,800, but was about 100 less than in the preceding year—a condition mainly due no doubt to enlistments from the fishing communities in Canada's armed services and to the growing demand for workers in war industries. The number of fishermen was 68,817 and the number of persons employed in processing plants was 15,038. Of the fishermen, 54,816 were at work in the sea fisheries and 14,001 in the fresh water fisheries.

Of the total investment of \$49,478,000, nearly \$26,219,700 was invested in vessels, boats, gear, etc., and the remainder, or about \$23,228,000, was the capital represented by processing plants.

Production by Provinces.—Table 1, below, shows the marketed value of the 1940 production by provinces, together with the like figures for each of the three preceding years. In table 2 the marketed value figures for the sea fisheries and inland or fresh water fisheries, respectively, for 1940 are given.

TABLE I.—MARKETED VALUE BY PROVINCES

	1940	1939	1938	1937
	\$	\$	\$	\$
Nova Scotia.....	9,843,326	8,753,548	8,804,231	9,229,834
New Brunswick.....	4,965,618	5,082,393	3,996,064	4,447,688
Prince Edward Island.....	714,870	950,412	930,874	870,299
Quebec.....	2,002,053	2,010,953	1,957,279	1,892,036
Ontario.....	3,035,100	3,010,252	3,353,775	3,615,666
Manitoba.....	1,988,545	1,655,273	1,811,124	1,796,012
Saskatchewan.....	403,510	478,511	468,646	527,199
Alberta.....	450,574	490,724	492,943	433,354
British Columbia.....	21,710,167	17,698,989	18,672,750	16,155,439
Yukon.....	4,994	4,867	5,290	8,767
Totals.....	45,118,757	40,075,922	40,492,976	38,976,294

TABLE II

	Sea	Inland	Totals
	\$	\$	\$
Nova Scotia.....	9,843,326	.....	9,843,326
New Brunswick.....	4,939,962	25,656	4,965,618
Prince Edward Island.....	714,870	.....	714,870
Quebec.....	1,701,733	300,320	2,002,053
Ontario.....	.....	3,035,100	3,035,100
Manitoba.....	.....	1,988,545	1,988,545
Saskatchewan.....	.....	403,510	403,510
Alberta.....	.....	450,574	450,574
British Columbia.....	21,710,167	.....	21,710,167
Yukon.....	.....	4,994	4,994
Totals.....	38,910,058	6,208,699	45,118,757

SEA FISHERIES RESULTS

The following table shows, by provinces, the total commercial production of sea fish and shellfish during each of the calendar years 1940-1939:—

	1940	1939
	lbs.	lbs.
Nova Scotia.....	276,933,100	278,394,800
New Brunswick.....	143,950,100	157,790,000
Prince Edward Island.....	25,591,500	30,566,100
Quebec.....	97,674,200	90,913,400
British Columbia.....	592,666,500	417,621,400
Totals.....	1,136,815,400	975,285,700

Reference to sea fisheries operations and their results during 1940 will be found in more or less detail in Appendix No. 1, and Appendix No. 2, which embody the respective reports of the Department's eastern and western Chief Supervisors. Some reference has already been made in the preceding paragraph as to the outcome of operations in several of the more important sea fisheries.

The year's landings of halibut were not quite as large as the catch of 1939. They totalled 148,200 hundredweights or about 36,500 hundredweights less than in the preceding year. The decrease was mainly in the Atlantic area where the fishermen brought ashore less than 21,300 hundredweights as against 50,700 hundredweights. The Pacific coast of course is the scene of the Dominion's principal halibut fishery; the catch by British Columbia halibut fishers during the year was slightly more than 126,900 hundredweights, showing a drop of approximately 6,000 hundredweights.

Landings of sardines, all made on the Atlantic coast, totalled 224,300 barrels or 92,600 less than in 1939. There was also a sharp drop in production from the mackerel fishery, another Atlantic coast fishery, the catch amounting to 357,350 hundredweights. The landings of haddock on the Atlantic coast were nearly 355,600 hundredweights, but in the year before the haddock production had exceeded 385,100 hundredweights.

In the British Columbia pilchard fishery the catch was more than five times as large as in 1939, or 575,400 hundredweights as compared with 110,400 hundredweights. Accompanying the great increase in pilchard catch was a similar rise in the output of the pilchard canneries, which packed more than 59,100 cases or not very much less than nine times the quantity produced in the year before.

The Lobster Fishery.—A number of details as to the production from the lobster fishery during 1940 will be found in the following table, together with similar details for each of the three preceding years. The table shows that total catch for 1940 was substantially smaller than in any of the three earlier years. As compared with 1939 results there were catch decreases in all three of the Maritime Provinces and though there was an increase in Quebec it was less than a thousand hundredweights. In some measure, no doubt, the net decrease was due to uncertainty which, prior to the adoption of the federal canned lobster control scheme, had existed in the industry, following the loss of the European markets as a result of the war. Even with the stabilizing effect of the control scheme, the cannery pack for the year, as will be seen from the table, was considerably smaller than the output in 1939. On the other hand, trade in live lobsters—most of them shipped to the United States—was slightly larger than in the preceding year and substantially larger than in either 1938 or 1937. All told, the marketed value of the production from the fishery last year was \$3,187,594.

CATCH

	1940		1939		1938		1937	
	Cwts.	Marketed Value	Cwts.	Marketed Value	Cwts.	Marketed Value	Cwts.	Marketed Value
		\$		\$		\$		\$
Nova Scotia.....	131,935	1,784,526	144,910	2,011,223	155,405	2,282,169	158,961	2,757,880
New Brunswick...	61,225	856,837	81,262	1,003,070	68,474	721,612	72,586	1,089,002
Prince Edward Island.....	55,559	382,110	69,977	589,669	71,213	606,134	58,238	538,792
Quebec, including Magdalen Islands.....	19,232	164,121	18,516	178,363	19,293	183,304	20,165	247,755
(Magdalen Islands).....	17,320	140,991	17,101	162,129	17,181	155,917	17,304	199,527
Totals.....	267,951	3,187,594	314,665	3,782,325	314,385	3,793,219	309,950	4,633,429

SHIPPED IN SHELL

Nova Scotia.....	87,206	1,360,110	82,082	1,346,007	82,530	1,423,138	89,904	1,816,045
New Brunswick...	31,137	486,358	31,258	440,939	18,554	264,267	23,528	422,708
Prince Edward Island.....	5,552	67,093	9,745	101,618	11,072	117,044	2,064	26,153
Quebec, including Magdalen Islands.....	7,108	57,939	6,978	65,208	6,435	59,829	8,057	101,623
(Magdalen Islands).....	5,666	39,539	5,808	51,457	4,839	38,485	6,058	64,148
Totals.....	131,003	1,971,500	130,063	1,953,772	118,591	1,864,278	123,553	2,366,529

CANNED

Nova Scotia.....	21,678	386,216	30,157	572,590	37,838	734,086	34,649	817,814
New Brunswick...	15,021	261,471	25,706	491,450	23,060	403,473	26,957	624,128
Prince Edward Island.....	17,285	302,334	24,616	474,676	24,625	474,397	20,952	497,846
Quebec, including Magdalen Islands.....	5,012	86,556	5,214	102,047	7,481	121,841	6,023	144,332
(Magdalen Islands).....	4,777	81,826	5,099	99,684	6,223	115,843	5,623	134,448
Totals.....	58,996	1,036,577	85,693	1,640,763	93,004	1,733,797	88,581	2,084,120

TOMALLEY

Nova Scotia.....	1,908	14,471	2,921	23,719	3,684	33,873	3,588	37,250
New Brunswick...	550	4,126	594	4,473	686	5,128	1,215	10,039
Prince Edward Island.....	1,098	9,705	1,435	12,975	1,559	14,198	1,155	11,935
Quebec, including Magdalen Islands.....	57	510	98	956	119	1,094	174	1,080
(Magdalen Islands).....	57	510	98	956	116	1,049	155	931
Totals.....	3,613	28,812	5,048	42,123	6,048	54,293	6,132	60,304

LOBSTER MEAT

Nova Scotia.....	599	23,729	1,166	68,907	1,131	91,072	1,149	86,771
New Brunswick...	2,605	104,882	1,534	66,208	974	48,744	1,215	10,039
Prince Edward Island.....	109	2,973	10	400	11	495	62	2,858
Quebec, including Magdalen Islands.....	418	19,116	222	10,152	12	540	12	720
(Magdalen Islands).....	418	19,116	219	10,032	12	540	.....	.....
Totals.....	3,731	150,705	2,932	145,667	2,128	140,851	2,438	100,388

DRIED FISH PRODUCTION

The year saw substantial improvement in the position of the Dominion's dried fish industry, which is confined entirely to the Atlantic coast provinces. Total production of dried fish, including dried boneless fish, was 250,849 hundredweights, or nearly 21,300 hundredweights more than in 1939, and on the marketed value side there was an increase of a little more than \$396,600, with the value total amounting only to \$1,470,900. The quantity increase, in the case of dried fish, exceeded 17,700 hundredweights and the value increase was more than \$337,800. The production of boneless fish was 3,500 hundredweights and more above the 1939 figures and there was an increase in value of about \$58,800. The

major factor in the improvement of the industry's position was the war's effect in halting dried fish production in Norway and checking operations in Iceland—two countries which in normal times have given the Canadian producers severe competition.

The following tables give figures, by provinces, relating to the production of dried fish and dried boneless in 1940 and 1939, respectively.

PRODUCTION OF DRIED FISH

	1940		1939	
	Cwts.	Marketed Value	Cwts.	Marketed Value
		\$		\$
Nova Scotia.....	145,631	734,737	128,045	489,560
New Brunswick.....	25,271	152,912	20,912	101,104
Prince Edward Island.....	1,884	6,660	963	3,614
Quebec.....	44,118	266,204	49,225	228,420
Totals.....	216,904	1,160,513	199,145	822,698

PRODUCTION OF BONELESS DRIED FISH

Nova Scotia.....	32,917	300,898	28,765	237,347
New Brunswick.....	938	8,561	853	7,103
Prince Edward Island.....	90	900	252	1,972
Quebec.....			540	5,126
Totals.....	33,945	310,359	30,410	251,548

Inland Fisheries.—As shown by one of the foregoing tables production from the inland fisheries showed an increase of slightly more than \$100,000 in marketed value in 1940, as compared with the total for 1939. The net gain was due in chief part to an increase of more than \$300,000 in Manitoba. There were also gains in Alberta and Ontario, as well as in New Brunswick and the Yukon Territory, though operations in the latter areas were not on a large scale, but in Quebec fresh water returns decreased by about \$200,000 and in Saskatchewan there was a \$75,000 reduction.

The following table shows the catches of the principal varieties of fresh water fish in 1940 and each of the three preceding years:—

	1940	1939	1938	1937
	cwts.	cwts.	cwts.	cwts.
Whitefish.....	168,179	164,619	154,244	173,675
Pickarel.....	105,800	120,509	128,812	143,020
Tullibee.....	72,214	69,893	57,932	55,966
Trout.....	54,094	62,833	72,555	70,588
Pike.....	48,458	56,483	62,283	51,320
Herring.....	44,480	61,329	55,700	50,236
Perch.....	39,180	32,528	43,067	34,672
Blue Pickarel.....	21,184	61,575	73,171	94,496

NOTE.—Practically all of the Dominion's fresh water fisheries are under provincial administration and most of the figures in the foregoing table come from provincial government sources.

EXPORT TRADE IN FISHERIES PRODUCTS

Export business in products of the fisheries in 1940 amounted in all to \$32,662,000, roundly stated, or \$3,021,000 more than in 1939 when export trade had reached the highest level in a decade.

Sales to the United States totalled nearly \$16,496,900, an increase of close to \$2,836,000. Despite the attempted enemy blockade of Great Britain the year's shipments of Canadian fish and fish products to the United Kingdom increased by more than \$1,165,000 and amounted to \$9,883,700. As was to be expected, however, in view of wartime conditions, the export trade with countries other than the United Kingdom and the United States showed some decrease. It totalled approximately \$6,281,500, or about \$980,500 less than in the year before.

Stated in round figures the total export sales, exports to the United States, exports to Great Britain, and exports to other countries during 1940 and 1939 were respectively as follows:—

	1940	1939
	\$	\$
Total Sales.....	32,662,000	29,641,000
Sales to the United States.....	16,496,900	13,661,000
Sales to the United Kingdom.....	9,883,700	8,718,000
Sales to Other Countries.....	6,281,500	7,262,000

Exports for 1940 and 1939, shown in classes of products, were as follows, roundly stated:—

	1940	1939
	\$	\$
Fresh and Frozen Fish and Shellfish.....	14,110,700	12,309,000
Canned Fish and Shellfish.....	11,669,000	11,549,000
Dried, Pickled and Smoked Fish.....	4,063,400	3,884,000
Fish and Whale Oils.....	992,500	737,000
Other Products of the Fisheries.....	1,826,400	1,162,000

In 1939 the largest increase in export business, rated according to value, was in the trade in canned fish and shellfish. The major part of the 1940 increase, however, was in the trade in fresh and frozen products, which exceeded the business done in those commodities in 1939 by nearly \$1,802,000, and this notwithstanding that Great Britain, as a result of war conditions, had halted importations of frozen salmon and halibut which in pre-war days had been of substantial size and value. Most of the 1940 gain in the business in fresh and frozen products came, of course, in the trade with the United States. Exports of such products to that country amounted to a little more than \$12,010,000, or \$1,494,800 more than in the preceding year. As a matter of fact, as will have been seen from one of the foregoing tables, although the largest 1940 export increase was in the business in fresh and frozen fish, the year brought export increases in all classes of fisheries products. Sales of canned fish increased by a little more than \$120,000, sales of products in the dried and pickled and smoked group by \$179,400, sales of oils by nearly \$255,500 and the exports of miscellaneous products by more than \$664,000.

So far as value is concerned, the business in whitefish and the business in live lobsters were the largest single items in the export trade done in products in the fresh and frozen classification. More than 167,400 hundredweights of whitefish, valued at nearly \$2,031,900, and more than 115,400 hundredweights of lobsters, with a value of \$2,016,500, were exported. There were increases in quantity and value in each case.

Large increase in the sales of canned lobster to the United States was one of the year's outstanding developments. In peace time the United States had purchased only relatively small quantities of Canadian canned lobster—in 1938, for instance, 4,785 hundredweights. The great market for canned lobster from the Dominion was then in Europe, mainly in Great Britain, and only limited

effort had been made to develop the market in the United States. Sales to continental Europe came to an end at the outbreak of war and shortly afterwards Britain stopped canned lobster importation under one of its import control measures. With the overseas markets closed it became essential, if Canada's canned lobster industry were to continue, that the markets in North America be extended, and governmental action to this end was undertaken under conditions which are referred to in some detail elsewhere in this report. A large measure of success was achieved in enlarging sales in the United States. As compared with shipments of 4,785 hundredweights to the United States market in 1938, the Canadian sales in that country in 1940 showed an increase of nearly 200 per cent.

The second of the noteworthy developments in connection with the year's export trade in canned fisheries products was the tremendous expansion in the exportation of canned herring, principally from British Columbia. The great bulk of the shipments went to consumers in Great Britain, whose peace-time sources of supply had been dislocated by war. Total exports of canned herring from the Dominion in 1938 had amounted only to approximately 32,300 hundredweights. War increased the business in the latter part of 1939 and the total exportation for that year jumped to a little more than 90,000 hundredweights. In 1940, however, the export shipments totalled 196,849 hundredweights and their value slightly exceeded \$1,645,400.

Although the expanded business in herring and lobsters was the main feature of the trade in canned products, the export shipments of canned salmon continued as in other years to be greater both in quantity and value than those of any other canned fish. While this was true, the 1940 business in salmon, practically all of it salmon from British Columbia, decreased quite sharply from the 1939 level. Total exports during the year were slightly less than 462,600 hundredweights and they were valued at \$8,226,300, in round figures; as compared with 1939 trade, there was a drop of about 130,000 hundredweights on the quantity side and about \$401,000 in value.

Canned sardines were the fourth major product entering into the 1940 export trade in canned fish. The year brought substantial increase in this business. Export shipments of 107,200 hundredweights, valued at \$953,500, increased by nearly 20,200 hundredweights in quantity and \$228,800 in value, round figures being given in all cases.

One of the outstanding increases in the year's export business came in the case of dried cod, which is the principal commodity put up by Canada's dried fish industry. The industry always depends almost wholly upon export business and for some years past its position had been exceedingly difficult because of conditions in the dried fish trade which were beyond Canadian control. The war, however, has had the effect of taking out of competition the two European countries which, with Newfoundland, had been Canada's great competitors in the dried fish field and in 1940 the Dominion's exports of dried cod increased by over 4,200 hundredweights and by more than \$260,000 in value, with the totals for the year reaching 235,100 hundredweights and more than \$1,502,000.

CANNED LOBSTER CONTROL

Loss of European markets as a result of the war brought the Dominion's canned lobster industry face to face with a situation of the utmost gravity in 1940. It was this state of affairs which led the Government to set in motion a plan which came to be popularly known as the canned lobster control scheme, which was designed to save the industry from collapse, and, happily, succeeded in doing so. Testimony to the value of the scheme was given toward the close of the year by a representative conference of lobster fishermen and lobster canners which declared that it had averted disaster.

In pre-war days the great bulk of Canada's canned lobster output, say 80 per cent or more, was marketed in European countries, most of it in Britain. Sales in Canada and the United States were relatively small, and, indeed, with profitable markets open to them in Europe, the canners had made no intensive effort to build up sales in North America. Thus, as the 1940 canning season came near and with the European markets closed to them, the packers were without developed marketing channels which could be counted on to absorb more than a comparatively small part of the year's production. Unless something could be done to meet the emergency effectively, many of the packers would almost certainly find themselves unable to operate and others could operate on a limited scale only while the fishermen who normally sold to the canneries would find the outlets for their catches greatly curtailed.

The control scheme was so successful, however, in expanding North American demand for canned lobster that the packers were enabled to sell their entire output. Most of it had been sold by the end of the calendar year and the remainder a few weeks later. It is to be said at once, of course, that the pack, slightly less than 60,000 cases, was substantially smaller than the average annual pack in recent years—about 28,000 cases below the 1937-39 average—but it is safe to say that had it not been for the support given the industry by the control scheme the canners would have put up no such quantity as 60,000 cases and they would have had great difficulty in marketing even a much smaller pack. As it was, the canned lobster sales in Canada increased by several hundred per cent and the sales in the United States by a similar percentage. Nor is it to be forgotten that what was done under the scheme in 1940-41 in the way of market development not only enabled the packers to find sale for all of their 1940 output but opened up sales channels for the future.

It will be sufficient here to give only a broad outline of the plan which was followed. A Controller for Canned Lobster was appointed (the undersigned serving in that capacity) with authority to buy from the canners and to market from the 1940 pack a maximum of 55,000 cases, paying prices which, basically, were approximately 80 per cent of the average for the last three pre-war years. Purchases by the controller from any canner were conditional upon the packer having paid the fishermen for their live lobsters not less than a specified minimum price, which was at approximately 80 per cent of the pre-war level. All canned lobster bought by the controller was subject to inspection and grading under a system set up for the purpose.

A committee representative of the industry was named by the Government to act in an advisory capacity to the controller. An assistant controller was appointed to handle purchasing and another appointee, serving without salary, took charge of sales promotion and selling effort. Warehouses were opened at central points in the Maritime Provinces. Sales were handled from Toronto, an advantageous centre from which to "attack" the markets both in Central Canada, where there is the largest concentration of Canadian consumers, and in the United States. Direct approach was made to large-scale food distributors in both countries to induce them to handle increased quantities of canned lobster, and to assist in developing demand within the Dominion an advertising campaign was also carried on through publications having nation-wide circulation and through the distribution of appropriate display material to food dealers.

The purpose of the campaign and other sales promotion effort was to increase demand for Canadian canned lobster generally, not simply to stimulate demand for the lobster, marketed under the registered brand name, *Canada Brand*, which was sold by the controller. Packers were under no compulsion to sell their packs through the controller, and, as a matter of fact, the quantity handled by him was less than 6,000 cases, but the canners who did their own marketing found demand created for their goods by the pro-

motional steps taken under the scheme. Demand was created and, at the same time, the controller's operations had the effect of stabilizing market conditions which had threatened to be chaotic. The net result was, as already said, that the fishermen had cannery outlet for their catches as usual and the packers were enabled to dispose of their entire output at prices which yielded fair return.

As has been said, all of the lobster bought by the controller was bought on an inspected-and-graded basis and the price paid to a canner for any parcel depended upon the grade, Fancy, Choice or Standard, which qualified inspectors working under the control plan found it to merit. Other packs were not subject to governmental inspection and grading. It is satisfactory to be able to say that buyers of *Canada Brand* found the product to be uniformly of thoroughly sound quality and it was regarded with high favour by experienced food distributors. Variations in quality have led to some criticism of Canadian canned lobster in the past. It is to be hoped that it will be possible in the very near future to establish a condition of affairs in which all Canadian canned lobster will be subject to inspection and grading by public officials trained and competent for such work so that consumers may thus have guarantee of quality in the lobster which they buy. The North American markets, even more than markets in other countries, look for graded food products and the fact should be recognized by all branches of our fishing industry if their goods are to meet successfully the competition of other foods.

FUR SEAL RETURN

Canada's net return on fur seal account under the Pelagic Sealing Treaty in 1940-41 amounted to \$85,793.95—the difference between total revenue of \$160,810.77 and expenditures in dressing and dyeing costs, sales tax, customs and transportation charges, etc., amounting to \$75,016.82.

On the revenue side the largest item was one of slightly more than \$120,300, which represented the receipts, less sales commission, from the sale of 6,057 pelts which were sold at fur auctions in Montreal under the department's plan of marketing in Canada the Dominion's annual fifteen per cent share, under the treaty, of the sealskins taken by the United States Government at the Pribilof Islands and adjacent rookeries. The other revenue items were \$2,975, (cents dropped), received from the Japanese Government as the proceeds from the sale of 210 skins which made up Canada's 10 per cent share under the treaty of certain pelts taken on Japanese rookeries and marketed by the Japanese authorities; \$5,477, proceeds from the sale in London of 419 skins which had been included in shipments sent to England several years ago when the Dominion followed the plan of marketing pelts in the Old Country; and \$32,044, which was the Canadian share of the proceeds from sales made by the United States Government at St. Louis, Mo. The skins entering into the St. Louis sales were from the 1939 kill at the Pribilof Islands. Pending liquidation of stocks already in Canada's hands it was thought best to have the Dominion's share of the 1939 pelts marketed in the United States, although it is now the general policy to sell on the domestic market the Pribilof skins to which Canada becomes entitled under the treaty each year. It may be added that sales of the 1939 pelts had not been completed when the Dominion's books were closed for 1940-41 and \$32,044 is not the total amount that will be realized by Canada from the St. Louis sales.

During 1940 a total of 65,263 sealskins were taken by the United States Government under the treaty and Canada's share was 9,789 or over 700 more than in 1939 and over 1,000 more than in 1938. The Alaska seal herds have continued to grow steadily larger since the Pelagic Sealing Treaty came into operation thirty years ago, thus permitting larger numbers of skins to be taken. In 1911 the number of animals in the herds frequenting the Pribilofs was estimated at less than 150,000 but the 1940 estimate was more than 2,185,000.

FISH CULTURE

Fish cultural operations in 1940 were carried on by the department in these provinces, viz., Nova Scotia, New Brunswick and Prince Edward Island, where the fisheries are entirely, or to a large extent, under federal administration. Thirteen main hatcheries, one subsidiary hatchery, six rearing stations, seven salmon retaining ponds and several egg-collecting camps were operated. Only the more important freshwater and anadromous food and game fishes such as Atlantic and seabago salmon, speckled, rainbow and salmon trout were propagated. In addition over 946,000 sockeye salmon eyed eggs were planted in waters of Vancouver Island, British Columbia. The total output from all establishments in 1940 was 27,931,800 in various stages of development up to adult fish.

A detailed report on fish cultural operations for the year is to be found in Appendix 9.

FISHING BOUNTY

All told, 17,132 boat fishermen, 3,499 vessel fishermen, owners of 9,926 fishing boats and owners of 711 fishing vessels received fishing bounty during the year. The payments aggregated \$159,920.40. These Atlantic coast bounties were paid under authority of "An Act to Encourage Development of Sea Fisheries and Building of Fishing Vessels."

Total bounty payments by provinces were: Nova Scotia, \$81,105. New Brunswick \$20,002.30, Prince Edward Island \$10,058.90, and Quebec \$48,754.20.

Details of the distribution are shown in the table below:

1940-41

Province and County	Boats	Men	Amount	Vessels	Tons	Average Tons	Men	Amount	Total Amount
			\$ cts.					\$ cts.	\$ cts.
<i>Nova Scotia—</i>									
Annapolis.....	162	255	1,845 00						1,845 00
Antigonish.....	136	201	1,462 60						1,462 60
Cape Breton.....	285	475	3,416 80	40	589	15	172	1,769 40	5,186 20
Cumberland.....	3	3	22 80						22 80
Digby.....	334	579	4,155 40	34	485	15	90	1,106 00	5,261 40
Guysborough.....	545	871	6,288 00	39	529	14	122	1,364 40	7,652 40
Halifax.....	724	933	6,878 60	40	681	17	205	2,094 80	8,973 40
Inverness.....	234	523	3,685 00	7	83	12	36	331 40	4,016 40
Kings.....	51	59	440 40						440 40
Lunenburg.....	651	804	5,952 60	64	3,326	52	1,074	10,724 00	16,676 60
Pictou.....	28	40	292 00						292 00
Queens.....	167	276	1,988 60	18	234	13	70	717 00	2,705 60
Richmond.....	433	525	5,819 20	24	301	12	76	785 30	6,604 50
Shelburne.....	708	1,112	8,043 20	100	1,549	16	392	4,222 10	12,265 30
Victoria.....	214	327	2,368 20	16	209	13	55	586 40	2,954 60
Yarmouth.....	88	186	1,315 60	23	1,399	15	305	3,430 20	4,745 80
Totals.....	4,763	7,469	53,974 00	475	9,385	20	2,597	27,131 00	81,105 00
<i>New Brunswick—</i>									
Charlottetown.....	230	422	3,008 00	13	152	12	42	439 00	3,447 00
Gloucester.....	453	825	5,885 20	147	2,650	18	584	6,678 20	12,563 20
Kent.....	210	349	2,513 40	8	86	11	24	251 60	2,765 00
Northumberland.....	25	50	351 80	12	131	21	22	292 10	643 90
Restigouche.....	3	8	55 80						55 80
Saint John.....	18	27	198 20	1	15	15	4	42 60	238 80
Westmoreland.....	26	40	288 40						288 40
Totals.....	965	1,721	12,298 80	181	3,034	17	676	7,703 50	20,002 30
<i>Prince Edward Island—</i>									
Kings.....	240	335	2,441 40						2,441 40
Prince.....	437	791	5,608 30	1	12	12	4	39 60	5,647 90
Queens.....	147	277	1,969 60						1,969 60
Totals.....	824	1,403	10,019 30	1	12	12	4	39 60	10,058 90
<i>Quebec—</i>									
Bonaventure.....	400	754	5,371 60						5,371 60
Gaspé.....	2,209	4,433	31,426 60	12	127	11	45	437 50	31,864 10
Matane.....	145	234	1,803 80	42	497	12	177	1,718 30	3,522 10
Saguenay.....	620	1,118	7,996 40						7,996 40
Totals.....	3,374	6,539	46,598 40	54	624	12	222	2,155 80	48,754 20
Grand Totals.....	9,926	17,132	122,890 50	711	13,055	18	3,499	37,029 90	159,920 40

NOTE.—A number of "Late" claims, amounting in all to \$3,008.90, which are included in this statement, are for the season of 1939. As the basis of distribution for 1939 differed somewhat from that of 1940, a number of the figures in the "Amount" columns above do not, as a result, balance with the number of claims paid.

The 1940 basis of distribution was as follows: (1) To owners of vessels entitled to receive bounty, \$1 per registered ton, payment to the owner of any one vessel not to exceed \$80; (2) to vessel fishermen entitled to receive bounty, \$6.90 each; (3) to owners of boats measuring not less than 12-foot keel, \$1 per boat; (4) to boat fishermen entitled to receive bounty, \$6.60.

PACIFIC SALMON COMMISSION

The International Pacific Salmon Fisheries Commission was established in the fall of 1937 under a convention between the United States and Canada for the protection, preservation and extension of the sockeye salmon fisheries of the Fraser River system. By understandings attached to the treaty, the Commission will begin regulation when the investigations have covered two cycles of sockeye runs, or eight years.

The season of 1940 was the third since the investigations of the Commission began in the summer of 1938. That of 1941 will be the final year of the first of the two cycles specified in the Convention establishing the Commission.

The objective of these investigations is to determine means whereby the former great runs to the Fraser river can be restored. The last of these, in 1913, would be worth in excess of \$35,000,000 at present prices.

The program for the necessary investigations was formulated, discussed and approved in 1938. It was explained to an Advisory Board chosen from the industry. It has been conducted, and is being continued, in a way which will enable the four years to be compared properly, since they constitute a cycle in which the four-year old adult salmon return to spawn.

During 1940 the Commission held two meetings, the first in Washington, D.C., in January, the second in Vancouver, B.C., in September. At the earlier meeting, Mr. B. M. Brennan was elected as Chairman for the ensuing two-year period succeeding Mr. A. L. Hager, first Chairman of the Commission. Mr. Brennan had been secretary and Mr. Tom Reid was elected to succeed him. At the second meeting, the Advisory Board met the Commission and discussed the results of the investigations.

The Commission now consists of:—

For Canada—

Mr. A. L. Hager, Vancouver, B.C.

Mr. A. J. Whitmore, Ottawa, Ont.

Mr. Tom Reid, M.P., Secretary, New Westminster, B.C.

For United States—

Mr. B. M. Brennan, Chairman, Seattle, Wash.

Mr. Edward W. Allen, Seattle, Wash.

Mr. Charles E. Jackson, Washington, D.C.

The investigations have made excellent progress in the study of matters basic to the regulatory powers which will be exercised at the end of the next four-year cycle. They are determining, either for the whole run or, when necessary, for each race of sockeye in the Fraser system, the following:—

- (1) The proportion of Fraser River sockeye in the Commercial catch in each locality and each part of the season ;
- (2) The duration and locality of the stay of each race in each salt water fishing area, as related to the catch and the subsequent escapement;
- (3) The existence and character of obstructions to adult migration in the rivers;
- (4) The time of passage past these obstructions and other important points in the river, as these are characteristic for each race;
- (5) The effect of Indian fishing;
- (6) The numbers of salmon which escape to each spawning ground;
- (7) The catch, its locality, gear, and place;
- (8) The history of the sockeye catch and escapement in so far as it is shown by the existing past records.

The experiments at Cultus Lake, begun in 1925 by the Canadian Government to study methods of increasing the run, are being continued. A survey of the Fraser system, its spawning grounds, obstructions, etc., is being completed.

To these ends, 930 sockeye were tagged at Sooke in 1940 and tags were returned from 45% of these. In salt water 3,270 tags were placed and 50% returned. At Hells Gate 5,194 were tagged and 34% of the tags were returned. Four observers were maintained in the commercial fishing areas, and a statistical system was inaugurated. Six spawning ground observers were employed to observe the escapement, which was estimated as about one in four fish. A special experiment to develop methods of measuring the escapement, and to detect spawning which cannot be directly observed, was carried on in the Harrison-Birkenhead system. The collection and study of the voluminous records of all kinds which have to do with the Fraser river run of sockeye was continued as outlined in previous reports. At Cultus Lake, 74,121 adult salmon were admitted through the weir in the fall of 1940; the seaward migrants during the spring numbered 1,374,938; and 4,292 coarse fish and predators were removed from the lake. Experiments were conducted on the value of various methods of marking the young. Racial studies were continued, and chemical analysis of changes in the adults of various races receiving some attention.

The season of 1940 was characterized by a heavier run than usual through Johnstone Straits, by a short season in the commercial fishery, and by heavy spawning in the Lake Chilko grounds. Returns of tags were accordingly lighter than in the preceding year, there being 65% in 1939, and the stay in salt water was much shorter. The surveys of spawning grounds showed the escapement to have been correspondingly greater.

These studies were conducted under the direction of Dr. W. F. Thompson by a staff, the principal members of which were Mr. F. H. Bell, Dr. J. L. Kask, Mr. M. B. Schaefer and Mr. C. E. Atkinson. The headquarters of the Commission are at New Westminster and a small laboratory is maintained at Seattle.

INTERNATIONAL FISHERIES COMMISSION

During 1940 the International Fisheries Commission continued the regulation of the North Pacific halibut fishery, and the investigations of the fishery and of the life history of the halibut, as provided for in the treaty of 1937 under which the Commission operates.

Hearings were held in late November and early December at Seattle, Vancouver, Prince Rupert, Ketchikan, Petersburg and Juneau. These were arranged at the request of the Governments of Canada and the United States to ascertain the attitude of the halibut fleets toward the provisions of a proposed treaty which was drafted in 1938 at the urgent request of the fleets to give legal support to their voluntary system of control of the rate of landings. At the hearings, the scientific findings of the Commission were also explained and matters relating to regulation were discussed.

Travel of the Commission to and from the hearings in northern British Columbia and southeastern Alaska was greatly facilitated by the action of the United States Fish and Wildlife Service in placing its vessel *Brant* at the disposal of the Commission for that purpose.

Executive meetings of the Commission were held on September 5 and on December 1, 2, 9, and 10, during and immediately following the hearings. At the September meeting the resignation of Dr. W. F. Thompson as Director of Investigations was accepted and Mr. H. A. Dunlop was appointed to succeed him. During the December meetings matters pertaining to the proposed treaty and to the investigation and regulation of the fishery were considered.

Regulations governing halibut fishing in 1940 were similar in most respects to those of 1939. The annual catch limits of 22,700,000 pounds for Area 2 and 25,300,000 pounds for Area 3 were retained. However, a few important changes were incorporated. To facilitate enforcement, clearance for fishing was limited to a single regulatory area during any one trip and the examination of all records dealing with the landing, purchase, and sale of halibut was provided for. The possession of halibut weighing less than five pounds was prohibited. At the request of the fishing fleet, the method of closure of Area 3 was made the same as for Area 2, namely, by the setting of a last date of fishing only.

The 1940 fishing season was opened for all areas on April 1 as in the previous year. The catch limit for Area 2 was attained and Areas 1 and 2 were closed to halibut fishing at midnight of July 13, sixteen days earlier than in 1939. The Area 3 catch limit was reached and Areas 3 and 4 were closed at midnight of September 26, thirty-two days earlier than in the previous year. Permits for the retention of halibut caught incidentally during fishing for other species in Areas 1 and 2 after closure to halibut fishing became invalid at midnight of September 30.

Several factors, which increased the rate of landing, contributed to the earlier attainment of the catch limits in Areas 2 and 3, and the earlier closure of the areas. In Area 2, these were an increase in the number of boats fishing, an increase in the size of trip permitted under the fishermen's own agreement for the control of the rate of landing, and the restriction of fishing to a single area per trip which reduced the incorrect reporting of the area of origin of catches. The factors chiefly responsible for the shorter Area 3 season were the above-mentioned change in the method of closure of that area and the landing of a greater proportion of the trips at ports close to the fishing grounds, which reduced the length of many trips.

Landings of halibut reported during the year amounted to 53,239,270 pounds. Of this amount, 768,878 pounds were reported from Area 1, to the south of Willapa Harbor, Washington; 25,492,835 pounds from Area 2 between Willapa Harbor and Cape Spencer, Alaska; and 26,978,557 pounds from Area 3, between Cape Spencer and the Aleutian Islands. No fishing was done in Area 4, which is in the Bering Sea region. The Area 2 landings included 300,554 pounds taken under permit to retain halibut caught incidentally during fishing for other species after closure of the area.

Scientific investigations were continued where necessary for the fulfilment of the purposes of the treaty. They included the collection and analysis of the current Biological and statistical data, by which the success of past regulation is determined and on which rational regulations must be based. The collection of biological data at sea made vessel operations necessary.

Study of the changes occurring in the size-composition of the stocks of adult halibut as a result of regulation was continued by means of measurements of the fish in the commercial catches. More than 81,000 halibut from representative trips were measured at Seattle. Materials for the study of age-composition were taken simultaneously. The measurements showed that fish of spawning size were abundant in Area 3 but were still relatively scarce in Area 2. Analysis of the measurements from Area 2 failed for the third consecutive year to show any significant improvement in the average size of the fish or in the proportion of fish of spawning size.

The tagging of mature fish and the collection of biological materials and data for the study of the spawning stocks in the northern part of Area 2 were undertaken during the spawning season in the winters of 1939-40 and 1940-41. A chartered vessel was utilized each winter for the purpose. Between December, 1939, and February, 1940, 875 halibut were tagged near Cape St. James in British Columbia and 428 off the coast of southeastern Alaska. An additional 497 were

tagged in the latter region in November and December, 1940. The fishing which was carried on for tagging purposes, proved that spawning halibut are still scarce in Area 2. The migrations of tagged fish, recovered during 1940 from the experiment of the previous winter, showed that the stocks of mature fish in northern British Columbia and southeastern Alaska are intimately related. They also corroborated previous findings that the Area 2 spawning stocks are independent of those on the grounds west of Cape Spencer, in Area 3.

The abundance of halibut, as indicated by the catch per unit of fishing effort, showed some improvement during the year. The average catch per skate in Area 3, which was approximately 116 pounds in both 1938 and 1939, increased to 121 pounds in 1940. In Area 2 the catch per skate increased from 60 pounds in 1939 to 64 pounds in 1940 but failed to reach the 1938 average of 69 pounds. The catch per unit of fishing effort in Areas 2 and 3 was 84 and 89 per cent greater, respectively, in 1940 than in 1930, when the abundance of halibut reached the lowest point in the history of the fishery.

Determination of the production of spawn was continued in Area 2 by means of quantitative net hauls, the most practical and direct way of measuring changes in the spawning stock as soon as they occur. A chartered vessel was operated for the purpose from early December, 1939, to the middle of February, 1940, in the vicinity of Cape St. James. During that period, 389 net hauls were made at 140 different stations. Hydrographic samples were also taken at 17 stations to ascertain the conditions prevailing where the eggs and larvae were found. Similar operations were again undertaken in the same region at the end of December, 1940.

Analysis of the catches of eggs and larvae during the 1939-40 spawning season and comparison of the results with those of previous years were carried out by approved methods. The production of eggs was 44 per cent greater than in 1938-1939, but 11 per cent and 38 per cent less than in 1937-38 and 1936-37, respectively. The cessation of the sharp decline in spawning which occurred in Area 2 during the 1937-38 and 1938-39 seasons and the partial recovery during 1939-40 are encouraging. However, decision as to the present trend of abundance of the spawning stock must await subsequent observations of the success of spawning because of short time fluctuations that frequently occur in the production of spawn by marine fishes.

The members of the Commission are Messrs. L. W. Patmore, Victoria, B.C., and A. J. Whitmore, Department of Fisheries, Ottawa, Ont., representing Canada, and E. W. Allen, Seattle, Washington, and C. E. Jackson, United States Fish and Wildlife Service, Washington, D.C., representing the United States. Mr. Patmore is the Chairman and Mr. Allen the Secretary of the Commission.

D. B. FINN,
Deputy Minister of Fisheries.

APPENDIX No. 1

REPORT OF COLONEL A. L. BARRY, CHIEF SUPERVISOR OF FISHERIES, EASTERN DIVISION, FOR THE YEAR 1940

Total landings of all species of fish taken in the division during the year were less than in 1939 by over 19,290,000 pounds but the landed value increased by approximately \$182,000. Due to higher prices prevailing during the year the market value total increased by nearly \$732,000. The drop in production was due to a decrease of approximately 13,000,000 pounds in New Brunswick and a decrease of approximately 5,000,000 pounds in Prince Edward Island. A decrease occurred in the Nova Scotia catch but this was more than offset by an increase in catch in the Magdalen Islands. The varieties showing decreases in catch in excess of 1,000,000 pounds were: sardines, a decrease of 18,524,000 pounds; mackerel, 16,614,000 pounds; lobsters, 4,417,000 pounds; haddock, 2,977,000 pounds; halibut, 2,851,000 pounds. The largest single increase was in the catch of cod, a gain of 25,810,000 pounds.

The total quantity of all fish and shellfish landed was 471,951,200 pounds with a landed value of \$8,605,367 as compared with 491,241,400 pounds with a landed value of \$8,423,372 in 1939.

The approximate total quantities and marketed values of the fish and shellfish produced in the division for the past six years were:—

—	Production	Marketed Value
	lbs.	\$
1940.....	471,951,200	15,931,150
1939.....	491,241,400	15,198,943
1938.....	465,034,800	14,091,504
1937.....	455,000,000	14,945,696
1936.....	472,000,000	14,764,797
1935.....	419,000,000	13,081,989

THE LOBSTER FISHERY

There was a decrease of 4,717,100 pounds in the catch of lobsters when compared with 1939. Decreased catches occurred in all parts of the division, with the exception of the Magdalen Islands where a slight gain was noted. Total lobster catch for the division was 26,607,900 pounds valued to the fishermen at \$2,452,793 as compared with 31,325,000 pounds, valued at \$2,922,517, in 1939. The number of fishermen engaged in the lobster industry was 14,716 or about 3,320 less than last year.

The following table shows the trend of the lobster fishery during the past few years:—

—	Fishermen Licenced	Catch
		lbs.
1940.....	14,698	26,607,900
1939.....	18,038	31,325,000
1938.....	17,847	31,225,300
1937.....	18,832	30,708,900
1936.....	18,551	28,057,200
1935.....	18,146	31,725,000

The Nova Scotia catch decreased by 1,297,500 pounds, with a decrease of \$191,204 in landed value. Decreases occurred in the Cape Breton Island section and along the eastern mainland, in the western section of the province the catch increased considerably.

In New Brunswick the catch decreased by over 2,000,000 pounds with a decrease in landed value of approximately \$150,000. Smaller landings were made on both provincial coasts and unfavourable weather during the latter part of the fall season may be held largely responsible for the catch reduction.

Landings in Prince Edward Island were 1,437,008 pounds less than in the preceding year. Spring fishing did not become general until about May 10 and during the latter part of the fall season storms destroyed a large quantity of gear.

A slight increase in catch occurred in the Magdalen Islands but the landed value decreased by \$17,600 as the entire catch was canned, no shipments of live lobsters being made.

THE COD FISHERY

Greatly increased catches were noted in Nova Scotia and New Brunswick, resulting in a net increase of nearly 26,000,000 pounds in the total catch for the division. The catch in Prince Edward Island and the Magdalen Islands decreased by approximately 1,000,000 pounds in each district.

The total quantity of codfish taken in the division during the year was 155,113,400 pounds, with a landed value of \$2,344,388, as compared with 129,324,800 pounds and landed value of \$1,575,408 in 1939.

THE HADDOCK FISHERY

There was a decrease of 2,955,100 pounds in the catch of haddock. In Nova Scotia, where the bulk of the catch is taken, there seemed to be a scarcity of haddock on the inshore grounds. The catch in the Bay of Fundy area of New Brunswick increased over that of 1939.

The total quantity of haddock landed was 35,557,400 pounds with a landed value of \$754,768 as compared with 38,512,500 pounds with a landed value of \$658,577 in 1939.

THE HERRING FISHERY

There was an increase of over 4,465,000 pounds in herring landings over the previous year's catch. Nova Scotia catch increased by approximately 1,000,000 pounds and New Brunswick production by about 4,000,000. Decreases occurred in Prince Edward Island and the Magdalen Islands.

THE HALIBUT FISHERY

Halibut landings decreased by approximately 2,854,000 pounds. Fewer vessels fishing exclusively for this species explains for a large part of the decrease. The landed value decreased by about \$210,000.

THE SARDINE FISHERY

The sardine fishery, which is confined to the Bay of Fundy waters of New Brunswick, shows a decrease of 18,529,000 pounds in catch and a decrease of \$213,790 in landed value.

The production of sardines and the quantity canned in the past six years have been as follows:—

	Catch	Quantity Canned
	lbs.	cases
1940.....	44,860,400	504,140
1939.....	63,389,400	539,486
1938.....	36,881,800	349,887
1937.....	31,768,400	423,043
1936.....	49,273,600	393,854
1935.....	37,499,800	338,436

THE MACKEREL FISHERY

The catch of mackerel decreased by some 16,614,300 pounds. The heavy run of spring mackerel occurring in 1939 was not repeated in 1940 and catches in Cape Breton Island and along the Guysboro shore fell off considerably.

Total landings were 35,182,400 pounds with a landed value of \$348,053 as compared with 51,796,700 pounds and landed value of \$502,834 in 1939.

THE SMELT FISHERY

The catch of smelts increased by 1,175,400 pounds with an increase of \$126,546 in value to the fishermen. On the eastern shore of New Brunswick, where the bulk of the catch was taken, the increase amounted to approximately 976,500 pounds. The catch gain was chiefly in December and was general throughout the district.

The total smelt catch for the division was 7,419,800 pounds, with a landed value of \$421,059, as compared with 6,244,400 pounds and \$294,513 in 1939.

THE SALMON FISHERY

The commercial catch of salmon increased by 151,100 pounds but landed value fell off by \$14,346. The decrease in value was due to a permit requirement for shipments of frozen salmon to the United Kingdom which induced dealers to lessen the price paid to the fishermen. On the eastern shore of New Brunswick there was a slight decrease in the drift-net catch and an increase in trap-net fares.

Total landings for the division were 1,710,600 pounds with a landed value of \$228,935 as compared with 1,559,500 pounds with a landed value of \$243,281 in 1939.

THE SCALLOP FISHERY

The scallop fishery shows an increase of 17,075 gallons (shelled), the equivalent of 8,537½ barrels in the shell. Increases in catch occurred both in Nova Scotia and in the Bay of Fundy district of New Brunswick.

The total catch for the division was 66,539 shelled gallons with a landed value of \$128,712 as compared with 49,464 gallons with a landed value of \$62,059 in 1939.

OTHER FISHERIES

The catch of hake and cusk was greater by 1,531,900 pounds than in 1939, the Nova Scotia catch increasing by 2,558,300 pounds, and the catches of New Brunswick and Prince Edward Island decreasing by 859,600 pounds and 166,800 pounds, respectively. Total landings for the division were 22,526,900 pounds with a landed value of \$157,089, as compared with 20,995,000 pounds and \$104,827 in 1939.

Swordfish landings increased by 501,700 pounds; there were gains in Cape Breton Island and on the eastern mainland of Nova Scotia but in the western section of the province a decrease of 108,800 pounds. Total landings amounted to 2,290,100 pounds and had a landed value of \$253,531 as compared with 1,788,400 pounds and \$185,746 in 1939.

Production of oysters from the public beds increased by 4,600 pounds or 23 barrels. There were decreases in Nova Scotia and Prince Edward Island, but these were compensated for by increased catches on the eastern shore of New Brunswick, chiefly in the St. Simon and Shippegan areas of Gloucester county. The total catch for the division was 18,339 barrels, with a landed value of \$95,790 as compared with 18,316 barrels with a landed value of \$81,992 for the preceding year.

Nova Scotia

The total production of all varieties of fish in Nova Scotia during 1940 was 276,933,100 pounds, being about 1,461,000 pounds less than that of 1939. Returns to the fishermen increased by approximately \$492,000 and marketed value by approximately \$1,089,000.

In the western section of the province landings increased by over 2,000,000 pounds, but the eastern mainland catch decreased by approximately 1,400,000 pounds and the Cape Breton catch by about 1,700,000. The largest single decrease occurred in the mackerel fishery which yielded a catch more than 18,000,000 pounds less than in 1939. In the Cape Breton section the run of spring mackerel was almost a complete failure, particularly in Richmond county. On the Guysboro county shore large catches of spring mackerel were made in 1939, but this year the fish did not appear in large numbers. In the western section of the mainland the catch decreased by approximately 8,000,000 pounds.

The catch of cod shows an increase of nearly 24,000,000 pounds over 1939 figures. Cape Breton Island's share of this increase is due to heavier landings at North Sydney by the larger vessels fishing on offshore grounds. Landings at Halifax and Lockeport were considerably above those of the previous year, with landings at Lunenburg decreasing. The catch of lobsters decreased by 1,297,500 pounds, the catch of haddock by 3,510,800 pounds and the halibut catch by 2,854,900 pounds. There were increases in the case of swordfish, herring, salmon, hake and cusk, scallops, smelts and pollock.

The table below gives a comparison of the total catch, landed and marketed values, as compared with 1939, as well as similar information concerning the principal varieties.

1940

Total quantity of all fish landed.....	pounds 276,933,100
Total landed value.....	\$ 5,800,167
Total marketed value.....	9,843,326

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	13,193,500	1,457,279	1,784,526
Cod.....	130,682,300	2,079,303	3,694,110
Haddock.....	33,915,600	728,712	1,399,622
Mackerel.....	25,233,000	280,935	493,182
Halibut.....	1,898,000	200,271	267,844
Swordfish.....	2,290,100	253,531	320,452
Herring.....	27,508,000	192,223	537,469
Salmon.....	570,600	78,362	100,481
Hake and Cusk.....	16,068,700	122,670	119,398
Scallops (gallons).....	53,110	105,212	110,579
Smelts.....	856,000	51,467	56,086
Pollock.....	8,531,600	67,968	134,188

1939

Total quantity of all fish landed.....	278,394,800 pounds
Total landed value.....	\$ 5,308,016
Total marketed value.....	8,753,548

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	14,491,000	1,648,483	2,011,223
Cod.....	106,783,400	1,373,510	2,305,083
Haddock.....	37,426,400	635,631	1,310,391
Mackerel.....	43,950,900	416,426	723,424
Halibut.....	4,752,900	410,852	596,834
Swordfish.....	1,788,400	185,746	243,783
Herring.....	26,235,000	174,773	405,055
Salmon.....	505,300	76,337	88,572
Hake and Cusk.....	13,510,400	70,895	117,852
Scallops (gallons).....	45,955	57,840	74,774
Smelts.....	741,900	43,058	54,732
Pollock.....	7,320,100	40,490	86,932

New Brunswick

Total landings in New Brunswick, including the inland section, were 144,627,300 pounds, a decrease when compared with the previous year's total of 13,720,300 pounds. The drop was due in large measure to the greatly decreased catch of sardines. Landings of sardines were 18,488,000 pounds less than in 1939. Landings of lobsters, alewives, hake and cusk and shad were also lower. The catch of lobsters decreased in the Grand Manan area of the Bay of Fundy section, but on the Northumberland Strait shore there was a slight decrease in the spring fishing district and the late season district catch decreased by approximately 40 per cent. There was an increase of approximately 979,000 pounds in the catch of smelts. This increase occurred chiefly in December and was general along the eastern shore. The herring catch increased by over 4,000,000 pounds. Most of the herring catch on the eastern shore was used for bait or as fertilizer. On the Bay of Fundy shore these fish were extensively used in the production of canned herring in various forms. In addition to the canned herring market the Grand Manan smoked herring industry absorbed a considerable quantity of the fish which were marketed either smoked round or boneless.

The catch of salmon increased by about 84,000 pounds, but the value to the fishermen decreased when compared with last season's figures.

Cod landings increased by over 4,000,000 pounds, with a corresponding increase in the returns to the fishermen. The cod industry shows a considerable improvement in Gloucester county and a portion of the catch was converted into frozen fillets at the freezing and cold storage plant at Caraquet. The oyster catch shows an increase of 1,523 barrels, with the bulk of the gain occurring in the St. Simon and Shippegan areas, Gloucester county.

The total production for the province was 144,627,300 pounds, valued to the fishermen at \$2,028,399 and at \$4,965,618 as marketed, compared with 158,347,600 pounds valued at \$2,186,270 as landed and, as marketed, at \$5,082,393 in 1939.

The commercial catch of the inland district, which is included in foregoing provincial total and also includes the catch on the northwest and southwest Miramichi rivers, was 1,142,100 pounds with a landed value of \$39,559 and a marketed value of \$42,184. In 1939 the totals were 1,071,800 pounds, \$33,035 and \$34,848.

The table below gives a comparison of the total catch, landed and marketed values of all fish taken in New Brunswick during 1940, as compared with 1939, as well as similar information concerning the principal varieties taken.

1940

Total quantity landed.....	144,627,300 pounds
Total landed value.....	\$ 2,028,399
Total marketed value.....	4,965,618

	Lbs.	Landed Value	Marketed Value
		\$	\$
Sardines.....	44,596,400	359,493	1,882,860
Lobsters.....	6,122,500	542,495	856,837
Smelts.....	5,482,700	324,346	442,001
Herring.....	51,876,900	207,218	750,542
Salmon.....	1,133,800	149,941	199,605
Cod.....	13,135,100	150,504	274,665
Shad.....	1,559,700	42,479	46,381
Alewives.....	3,146,000	15,066	35,651
Oysters.....	2,257,000	56,230	75,485
Clams.....	6,640,700	49,518	109,094
Haddock.....	1,584,900	25,441	43,873
Hake and Cusk.....	2,165,600	12,958	30,623

1939

Total quantity landed.....	158,347,600 pounds
Total landed value.....	\$ 2,186,270
Total marketed value.....	5,082,393

	Lbs.	Landed Value	Marketed Value
		\$	\$
Sardines.....	63,084,400	573,078	2,299,017
Lobsters.....	8,126,200	692,864	1,003,070
Smelts.....	4,503,600	211,722	304,961
Herring.....	47,839,300	198,989	578,943
Salmon.....	1,049,500	166,474	195,710
Cod.....	8,525,300	79,566	141,572
Shad.....	1,890,500	49,998	56,401
Alewives.....	7,344,000	39,812	80,591
Oysters.....	1,952,400	38,101	54,711
Clams.....	5,079,700	35,382	72,201
Haddock.....	1,025,300	22,210	45,099
Hake and Cusk.....	3,025,200	15,218	30,747

Prince Edward Island

There was a decrease of 4,929,800 pounds in the total quantity of fish taken by Prince Edward Island fishermen during 1940. Lobster, cod and mackerel catches decreased by over 1,000,000 pounds each, with lesser decreases occurring in the case of oysters, herring, hake and cusk, and clams.

The lobster fishery decreased by 1,437,800 pounds in catch and \$110,512 in the landed value to the fishermen. The reductions were largely due to unfavourable weather conditions and to the fact that there were fewer men engaged in the fishery.

Cod landings decreased by approximately 1,300,000 pounds, the bulk of the catch being taken in June and July. Decrease in catches was general throughout the province and notwithstanding increased prices obtained for green-salted fish, there was a drop of about \$6,200 in the total cod marketed value.

The catch of smelts increased by 90,300 pounds with an increase of \$5,639 in value to the fishermen. The mackerel catch decreased by 1,015,400 pounds and herring catch by 524,300 pounds.

The oyster fishery shows a decrease of 174,400 pounds, or 872 barrels in the shell. The catch was taken principally from private beds in Prince county.

The table below gives a comparison of the Prince Edward Island total catch, landed and marketed values for 1940 with the 1939 figures as well as similar information concerning the principal varieties.

1940

Total quantity landed.....	25,636,300 pounds
Total landed value.....\$	553,620
Total marketed value.....	714,870

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	5,559,900	353,917	382,110
Cod.....	6,522,200	60,145	90,595
Smelts.....	1,061,600	43,721	60,746
Mackerel.....	1,521,200	12,317	25,123
Oysters.....	816,400	26,138	32,267
Herring.....	4,824,400	27,152	51,056
Hake and Cusk.....	4,292,600	21,461	46,242
Clams.....	381,400	1,937	11,601

1939

Total quantity landed.....	30,566,100 pounds
Total landed value.....\$	683,054
Total marketed value.....	950,412

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	6,997,700	464,429	589,669
Cod.....	7,845,000	62,263	96,858
Smelts.....	971,300	38,082	52,995
Mackerel.....	2,536,600	35,178	52,981
Oysters.....	990,800	27,850	37,008
Herring.....	5,348,700	27,438	53,858
Hake and Cusk.....	4,459,400	18,714	40,658
Clams.....	598,000	2,990	14,373

Magdalen Islands

The Magdalen Island fisheries increased by 821,600 pounds in landings as compared with 1939 results. The catch of lobsters increased by 21,900 pounds but lobster landed value was less by \$17,639 than in the preceding year. Cod landings decreased by 1,397,300 pounds but prices were somewhat higher than in 1939 and the decrease in landed and marketed values was, therefore, less than the drop in catch would suggest. Mackerel were plentiful during the year and the total catch increased by over 2,500,000 pounds.

The herring catch decreased by 320,800 pounds but the marketed value shows a small increase, due principally to better prices received for the smoked product, which was put up in large quantities. Smelts and clams decreased in both catch and values.

The table below gives a comparison of the total catch, landed and marketed value of all varieties taken, as compared with 1939, as well as similar information concerning the principal varieties.

1940

Total quantity landed.....	24,754,500 lbs.
Total landed value.....	\$ 223,181
Total marketed value.....	\$ 407,336

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	1,732,000	99,102	140,991
Cod.....	4,773,800	54,436	76,525
Mackerel.....	7,208,800	36,045	90,890
Herring.....	10,847,400	17,586	77,094
Smelts.....	19,500	1,525	1,784
Clams.....	138,000	690	690

1939

Total quantity landed.....	23,932,900 lbs.
Total landed value.....	\$ 246,032
Total marketed value.....	\$ 412,590

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	1,710,100	116,741	162,129
Cod.....	6,171,100	60,069	76,654
Mackerel.....	4,623,900	42,214	88,275
Herring.....	11,168,200	18,325	73,473
Smelts.....	27,600	1,651	1,822
Clams.....	205,000	1,025	1,025

SPORT FISHING

NOVA SCOTIA

Water conditions during the year were not satisfactory from an angling viewpoint. Weather conditions were also unsatisfactory, and in some districts the year was looked upon as a year without a summer. Nevertheless, the number of salmon taken by rod and line was greater than in 1939. Early in the season there was considerable rain with long stretches of cold damp weather. During the middle of the season, although rainfall was less, many parts of the province had cold, unseasonable weather. In the late season rainfall became heavier and probably resulted in many salmon reaching spawning areas. On the whole, trout fishing has been below average, although as noted, salmon anglers catch increased.

Angling in Cape Breton.—Salmon angling during the year was somewhat better in Cape Breton than during 1939. Water conditions on the Margarec were good until the middle of July; from then until August 25th dry weather prevailed. During September frequent rains kept the river in good condition, and many large salmon ascended. On North River, St. Ann, conditions were good throughout the year. On the Baddeck River larger numbers of salmon entered early in September and a much increased catch is shown. On Grand

River a decreased catch is noted, although fishing conditions seemed favourable. The table below gives the number of salmon taken by angling in 1940, as compared with 1939.

	1940	1939
Margaree River.....	474	314
North River, St. Ann.....	308	302
Grand River.....	37	45
Baddeck River.....	31	1

Trout fishing on the island was generally much poorer than in 1939, and this is reflected in a decrease in catch on all the principal producing waters with two exceptions—Trout River, Lake Ainslie; and Baddeck River.

During the year a limited control of predatory birds was maintained and it is considered that destruction of these birds is producing results.

Angling, Eastern Mainland.—In this part of the province angling conditions varied considerably, the salmon catch showing an increase and the trout catch a falling off. In Halifax County there was a considerable increase in the number of salmon taken, as compared with 1939. Salmon River, Port Dufferin, is making a notable recovery from depleted conditions and this can no doubt be attributed to the stocking carried out by the Bedford hatchery. Water conditions in this section were reported as being good except during the month of July. In Guysborough County salmon angling was much better than in 1939, particularly in St. Mary River where the catch increased by 355 fish; angling was exceptionally good in this river during the month of July, following heavy rains and the greatest number of fish were taken in that period. Wallace and Philip rivers also show increased catches this year, the fish in these streams having been taken during the early part of the season. The table below shows the catch of salmon and grilse on the principal rivers of the eastern mainland as compared with 1939 figures.

	1940	1939
<i>Halifax County—</i>		
Ingram River.....	187	166
Lawrencetown River.....	45	
Musquodoboit River.....	75	46
Sheet Harbour River.....	35	20
Salmon River, Jeddore.....	3	
Tangier River.....	88	51
West River, Sheet Harbour.....	174	51
East River, Sheet Harbour.....	48	19
Salmon River, Port Dufferin.....	217	45
Moser River.....	219	30
Nine Mile River.....	81	21
Petpeswick River.....	3	
Chezzetcook River.....	4	
Quoddy River.....	7	1
Kirby River.....	36	45
<i>Guysborough County—</i>		
St. Mary's River.....	617	262
Gaspereau Brook.....	26	7
Liscomb River.....	61	77
Ecum Secum River.....	150	30
Isaacs Harbour River.....	28	13
<i>Cumberland County—</i>		
Wallace River.....	202	127
River Philip.....	108	29

Angling, Western Mainland.—The Medway River produced the greatest number of salmon in this area, and shows an increase in catch of 300 fish over 1939 figures. The Mersey River, second most important river in the district, shows a catch decrease of 12 fish. Increased catches were made in East, Middle, Gold, Clyde, Tusket, Lequille, Round Hill and Nictaux rivers. Conditions generally were favourable throughout the district and during the early part of the season salmon could ascend all rivers, with the exception of the Gaspereau, where there was not sufficient water to allow them to ascend above White Rock pond. After September 17th, the late run fish were able to ascend all rivers with the exception previously stated. Salmon catches by rod and line were as follows, with the table also giving 1939 figures:

	1940	1939
<i>Lunenburg County—</i>		
East River.....	44	32
Middle River.....	56	46
Gold River.....	142	110
LaHave River.....	239	250
Petite Riviere.....	83	150
<i>Queens County—</i>		
Medway River.....	712	412
Mersey River.....	498	510
<i>Shellburne County—</i>		
Clyde River.....	33	4
<i>Yarmouth County—</i>		
Tusket River.....	66	10
<i>Digby County—</i>		
Salmon River.....	37	32
<i>Annapolis County—</i>		
Lequille River.....	33	23
Round Hill River.....	49	47
Annapolis River.....	9	16
Nictaux River.....	13	10
<i>Kings County—</i>		
Gaspereau River.....	7	53

Trout fishing was reported to have been generally good throughout Nova Scotia with increased catches occurring in most sections.

NEW BRUNSWICK

Salmon angling in New Brunswick shows a very satisfactory improvement over 1939 results. All rivers show a decided increase in catch, with the exception of the Kennebecasis where the season was the poorest in a number of years. On the Miramichi rivers salmon angling improved considerably, with the fish reaching upriver waters earlier than usual and good results were obtained on the Renous, Cain's and Dungarvon rivers. The southwest Miramichi in York and Carleton counties also benefited from this early run. The Tobique River had an excellent season, with July and August being particularly good months for angling. In the Restigouche River and its tributaries, and in the Jacquet and Kedwick rivers, 4,921 salmon were taken as compared with 4,272 in 1939. In the Nipisiquit, Tetagouche and Middle rivers 1,357 salmon were caught as compared with 1,165 in 1939. In the Tabusintac River there were 637 salmon and 140 grilse landed, as against 579 salmon and 145 grilse in the previous year. General fishing conditions were good and the increased catches are largely due to the heavy rains early in the season which brought all streams and rivers up to freshet levels. Heavy runs of salmon and grilse are reported to have reached the spawning grounds, which were in ideal condition, owing to the plentiful supply of water in the pools.

In the eastern section of the province trout fishing was better than in the previous year and for purposes of comparison the catch of trout by counties for 1940 and 1939 is shown below:—

	1940	1939
Restigouche County.....	16,450	13,860
Gloucester County (Chaleur shore).....	30,045	20,835
Gloucester County (East shore).....	9,850	6,875
Northumberland County.....	5,715	5,594
Kent County.....	4,765	4,865
Westmorland County.....	2,715	2,710

In the Bay of Fundy section trout fishing was not carried on as successfully as in 1939, save in the main Petitcodiac River where some very good catches were made. The landlocked salmon catch in Chamcook Lakes was poor, only 105 fish being taken and many of these were small. Due to the scarcity of pollock and haddock very little deep sea angling was done.

In the inland district the special permit angling season on the Miramichi opened somewhat earlier than in 1939, and permits for black salmon fishing were issued to 518 non-residents.

The following comparative table shows the number of salmon and grilse taken on the St. John and Miramichi River systems by rod and line in 1940 and 1939:—

	1940		1939	
	Salmon	Grilse	Salmon	Grilse
St. John River system.....	1,143	2,600	715	665
Miramichi River system.....	9,322	13,238	6,507	9,378

PRINCE EDWARD ISLAND

Water conditions in the ponds and brooks of Prince Edward Island were satisfactory, and during the early part of the season good catches were taken. Decreased catches were noted during the latter part of the season. Trout angling was not as good in the north shore ponds as was the case in 1939.

Prince County.—Early season fishing was good, but fell off considerably later on when the water became low and warm.

Northern Queens County.—Good fishing obtained from April 15 to June 30, but from July until the close of the season the sea trout did not ascend the streams in their usual numbers, but made their ascent when the fishing season was over. Rainbow trout fishing was satisfactory in both Glenfinnan and O'Keefes lakes.

Southern Queens and Kings.—As in the other counties, good to fair fishing obtained during the early part of the season, but as the water became warm catches fell off considerably and fishing generally was not as good as in former years.

Northern Kings County.—Trout angling was not as good as in the previous year. There were apparently large numbers of fish in this section of the county but they would not take the fly. The salmon catch in the trap at Morell River exceeded that of last year. A proportion of the fish were stripped while the others were liberated unstripped. The severe cold and stormy weather during the latter part of November made operations difficult.

FISHERIES PATROL SERVICE

NOVA SCOTIA

In Cape Breton Island the patrol boat *Rex* patrolled the waters of lobster fishing district 6A from May 16 to May 30. On June 4 this was replaced by the *Cabar Feidh* which boat continued operations until July 16.

Along the coast of the eastern mainland patrol service was carried on by the department-owned boats *Venning*, *Gilbert*, *A. Halkett* and the smaller chartered boats *Marmat* and *Momog*.

The *Venning* commenced patrol on April 4 and carried on patrol in Halifax county areas until June 14. The *Venning* then proceeded to the Northumberland Strait section and was employed there until November 8, when she returned to Halifax County. This boat completed her patrol season on January 10 after patrolling a total of 7,178 miles.

The *Gilbert*, after having the engine reconditioned, was placed on patrol on April 24 and proceeded to the strait section where she remained until June 9. The boat patrolled 1,588 miles and was then transferred to the western section of the province.

The patrol boat *A. Halkett* remained on the Atlantic coast from June 15 until July 17, when the motor patrol boat 666 was placed on board as a tender, and then proceeded to the strait section and remained until October 29 when she returned to the Atlantic area. From November 22 until the end of the year the boat acted as mothership for the fleet fishing out of Canso. During the patrol period of this boat, 3,712 miles were covered and in addition 1,523 miles were patrolled by the tender 666 and 33 miles by the small boat.

The *Marmat* was placed on duty May 20 and at the request of the owners was released from charter on June 29. This boat was replaced by the *Momog* on July 4. Patrol work was carried out between Pugwash and Port Hawkesbury, the *Marmat* patrolling 782 miles and the *Momog* patrolling 2,030 miles.

In the western section patrol work was carried out by the department-owned boats *Capelin*, *Gilbert*, and *A. Halkett*, assisted by a small chartered boat operated at Yarmouth and vicinity.

The *Capelin* patrolled the coastal waters from Yarmouth County to Kings County and covered a total of 6,101 miles. During the year this boat towed into port six schooners and sixteen boats that were in need of assistance.

The *A. Halkett* patrolled in the western district from January 1 to June 14, and was then transferred to the eastern district. During the early part of the year the *Halkett* acted as mothership to the fishing fleet operating from Canso. The remainder of the season was completed along the western shore of the province. All told, the boat patrolled a total of 1,480 miles before being transferred to the neighbouring district.

The *Gilbert* commenced work in the western section on June 15 and patrolled from Lunenburg County to Shelburne County, covering a total of 3,076 miles during the season.

The chartered boat, operated from Yarmouth, was employed for a period of three months and patrolled a total of 2,978 miles.

NEW BRUNSWICK

In the Bay of Fundy section, the department's patrol boats *Thresher* and *Gannet Rock II* were again employed throughout the year.

The *Thresher* operated from Welchpool and carried out general patrol service during the year. The *Thresher* patrolled a total of 9,161 miles and

was laid up during the month of December for engine repairs. During the year valuable service was rendered in assisting disabled fishing craft and in carrying out other humanitarian work.

The *Gannet Rock* was used principally in patrolling the Grand Manan areas and covered 5,906 miles during the year.

Two small boats were also employed, one at Grand Manan and one at Maces Bay. Both rendered valuable assistance in enforcing the lobster fishery regulations.

In the eastern section of the province, the following chartered boats were employed in the Northumberland Strait area:

Gulf Racer, *Gulf Raider*, *Gulf Scout* and *Gulf Runner*. They were used in patrol duties and in enforcing the lobster and salmon fishing regulations. During the season the boats gave satisfactory service and assisted the fishermen on numerous occasions. They were employed during the periods shown below:—

Name of boat	Dates Employed	Mileage Patrolled
<i>Gulf Racer</i>	May 2-November 28.....	8,415
<i>Gulf Raider</i>	May 27-November 20.....	6,518
<i>Gulf Scout</i>	{ June 3-August 22..... } September 26-October 26.. }	4,385
<i>Gulf Runner</i>	June 3-November 23.....	4,520

PRINCE EDWARD ISLAND

Seven patrol boats were engaged in fisheries protective work in Prince Edward Island during the season, three in West Prince, three in Queens and one in Kings County.

Services rendered by the chartered boat *Langholm*, operating in the North Cape-West Point area, were very satisfactory. A total of 6,530 miles was patrolled during the period May 1 to October 31.

The chartered boat *Maggie* rendered satisfactory service in the vicinity of the North Point boundary line covering 925 miles between May 10 and June 30.

The *Florence G.* was chartered for patrol work in the Alberton Bay area and patrolled very efficiently, travelling 3,416 miles from July 23 to November 20.

The chartered boat *Laura May* patrolled the Souris-Georgetown district and travelled 2,650 miles from August 1 to September 30.

The *Beulah* was operated satisfactorily in the Malpeque-North Lake area, from July 10 to September 25. A total of 2,145 miles was patrolled.

The *Mayflower* also gave satisfactory service in the Malpeque-North Lake area. During the period July 15 to September 30 a total of 1,391 miles was patrolled.

The department-owned patrol boat *Capitol* patrolled the Victoria-Georgetown area very effectively between May 1 and October 31 in preventing illegal fishing and enforcing the lobster size limit. This boat covered 6,094 miles during the season.

Generally speaking, the patrol services throughout the division gave effective protection during the fishing seasons. The boats were primarily engaged in the protection of the lobster fishing industry. They were also used in connection with the salmon, oyster, smelt and other fisheries and were of great assistance to the fishermen.

STATEMENT OF LOBSTER PACK AND THE INSPECTION OF CANNERIES DURING 1940

During the year 1940 licences to pack lobsters and tomalley were issued covering 148 canneries. Of the licensed plants 143 were actually operated, as compared with 191 in 1939, 213 in 1938 and 239 in 1937.

Comparative figures by provinces show the following distribution:—

	1940	1939	1938	1937
Nova Scotia.....	42	55	63	72
New Brunswick.....	46	67	74	79
Prince Edward Island.....	49	60	65	73
Magdalen Islands.....	6	9	11	15
Totals.....	143	191	213	239

*LOBSTER PACK

During 1940 the unrevised figures show a total production of canned lobster within the Division of 58,595 $\frac{3}{4}$ cases, compared with 85,578 cases canned in 1939, showing a decrease of 26,982 $\frac{1}{4}$ cases or 31.6 per cent.

Comparing the 1940 pack with previous years, the following results are noted:—

Year	Pack Cases	Increase or Decrease Cases	Percentage Increase or Decrease
1940.....	58,595 $\frac{3}{4}$		
1939.....	85,578	26,982 $\frac{1}{4}$	31.6
1938.....	91,746	33,150 $\frac{1}{4}$	36.1
1937.....	88,181	29,585 $\frac{1}{4}$	33.5
1936.....	87,390	28,794 $\frac{1}{4}$	33.0

Provincial statistics of pack for 1940 show decreases in pack in each of the Maritime Provinces and the Magdalen Islands.

Area	1940 Cases	1939 Cases	Increase or Decrease Cases
Nova Scotia.....	21,664 $\frac{1}{2}$	30,157	— 8,492 $\frac{1}{2}$
New Brunswick.....	14,869 $\frac{1}{2}$	25,706	— 10,836 $\frac{1}{2}$
Prince Edward Island.....	17,284 $\frac{1}{2}$	24,616	— 7,331 $\frac{1}{2}$
Magdalen Islands.....	4,777	5,099	— 322
	58,595 $\frac{3}{4}$	85,578	26,982 $\frac{1}{4}$

The pack for Nova Scotia during 1940 shows a decrease of 28.2 per cent when compared with 1939, and shows the following decreases when compared with previous years:—

Year	Pack Cases	Decrease Cases	Decrease Percentage
1938.....	37,838	16,193 $\frac{1}{2}$	42.8
1937.....	34,649	12,984 $\frac{1}{2}$	37.3
1936.....	37,690	16,054 $\frac{1}{2}$	42.5
1935.....	46,863	25,198 $\frac{1}{2}$	53.8

*Preparation of this report was necessary before final check of the year's statistics was completed and the canned lobster production figures for 1940 are therefore given subject to revision. Final figures for the year may be found in *Fisheries Statistics of Canada, 1940*.

The New Brunswick pack, as compared with 1939 output, shows a decrease of 10,836½ cases, or 42·2 per cent. When compared with previous years' packs the following decreases will be noted:—

Year	Pack Cases	Decrease Cases	Decrease Percentage
1938.....	23,060	8,190½	35·5
1937.....	26,957	12,087½	44·8
1936.....	20,418	5,518½	27·2
1935.....	18,275	3,405½	18·6

The pack in Prince Edward Island shows a decrease of 7,331½ cases, or 29·7 per cent. As compared with results in other years there were the following decreases:—

Year	Pack Cases	Decrease Cases	Decrease Percentage
1938.....	24,625	7,340½	29·8
1937.....	20,952	3,667½	17·5
1936.....	22,345	5,060½	22·6
1935.....	25,170	7,885½	31·3

On the Magdalen Islands the pack shows a decrease of 322 cases, or 6·3 per cent when compared with 1939. As compared with other years the 1940 figures show the following decreases:—

Year	Pack Cases	Decrease Cases	Decrease Percentage
1938.....	6,223	1,447	23·2
1937.....	5,623	850	15·1
1936.....	6,927	2,150	31·0
1935.....	8,656	3,879	44·8

During the spring season of 1940, 47,315½ cases were canned as compared with 62,547 cases in the spring of 1939, a decrease of 15,231½ cases or 24·1 per cent. Provincial figures covering the spring pack show the following decreases:—

Area	Cases Packed		Decrease Cases	Decrease Percentage
	1940	1939		
Nova Scotia.....	21,354½	29,472	8,117½	27·5
New Brunswick.....	7,078½	8,656½	1,577½	18·2
Prince Edward Island.....	14,105	19,319½	5,214½	26·9
Magdalen Is.....	4,777	5,099	322	6·3

During the fall season of 1940 the pack was 11,280½ cases, compared with 23,064½ cases in 1939, showing a decrease of 11,784 cases or 51 per cent. Provincial figures covering the fall pack show the following decreases:—

Area	Cases Packed		Decrease Cases	Decrease Percentage
	1940	1939		
Nova Scotia.....	310	708	398	56.2
New Brunswick.....	7,791	17,068	9,277	54.3
Prince Edward Island.....	3,179½	5,288½	2,109	39.8

CANNERY INSPECTION

During 1940 careful attention was again given to the inspection of all canneries and 939 inspections were carried out by 35 inspecting officers, the average number of inspections being 6.5 per cannery.

INSPECTIONS UNDER THE FISH INSPECTION ACT

Supervisor Robert Gray, who is directly responsible for the work done under the Fish Inspection Act in this division reports as follows with regard to inspections, etc., during the 1940 season:—

A total of 5,815 inspections of containers and fish were made during the year and 4,935 visits were made for educational purposes. Five thousand four hundred and fourteen inspections of fish curing premises, fish houses, etc., were conducted and sanitary conditions were satisfactory, with the exception of one fish-house. There were 258,640 empty containers inspected, of which 1,614 were reconditioned and 186 were condemned. A general improvement in the quality of staves and heading used in the manufacture of pickled fish containers has been noted.

A total of 9,989 barrels of alewives were inspected, 80 of which had to be reconditioned. Practically all the alewives cured this year were brought to Halifax in bulk where they were graded, weighed and prepared for market.

The inspection of 8,440 barrels, 7,255 half-barrels, 10 quarter-barrels and 10,384 pails of herring was conducted and of this quantity 236 barrels, 185 half-barrels and 291 pails were required to be reconditioned. Forty-three barrels, four half-barrels and ten pails were marked "Below Quality". During the year 168,861 eighteen-pound boxes and 109,082 two-pound boxes of hard cured smoked round herring were inspected. Of this lot 11,374 boxes were found to contain "Below Quality" fish.

There were 52,358 barrels, 245 half-barrels, 38 quarter-barrels and 797 pails of pickled mackerel inspected; 1,015 barrels required reconditioning and 2,339 contained "Below Quality" fish.

In addition, there were the following quantities of mackerel fillets inspected: 5,015 barrels, 26 half-barrels and 324 pails. Of this lot 140 containers were found to hold "Below Quality" fish.

During the year there were 12,964 barrels, 249 half-barrels and 6,675 boxes of oysters inspected.

A total of 364,091 boxes of frozen smelts were inspected.

Seven re-inspections of doubtful quality fish were conducted during the year. These consisted of 3,198 eighteen-pound boxes of bloaters, 321 barrels of mackerel, 24 barrels and 3 half-barrels of herring.

Attempts to cure herring by the Scotch method were carried out at Grand Harbor, Caraquet, Shippegan Island and Miscou Island, New Brunswick, and at Jeddore, Prospect, LaHave, West Dublin, Port L'Herbert and Kelly's Cove, Nova Scotia. These attempts met with varying degrees of success but all would have done better had they commenced operations earlier in the season.

DEPARTMENT OF FISHERIES

The following is a comparison of work done under the Fish Inspection Act for the past two years:—

	1940	1939
Educational visits	4,935	4,653
Inspections of premises	5,414	3,451
Empty containers inspected	258,640	369,875
Pickled alewives	9,990	10,737
Pickled herring inspected (bbls.)	8,440	5,762
“ “ “ (half-bbls.)	7,255	8,096
“ “ “ (quarter-bbls.)	10	132
“ “ “ (pails)	10,384	12,624
Pickled mackerel “ (bbls.)	52,358	63,078
“ “ “ (half-bbls.)	245	831
“ “ “ (quarter-bbls.)	38	1
“ “ “ (pails)	797	849
Pickled fillets “ (bbls.)	5,015	6,171
“ “ “ (half-bbls.)	26	3
“ “ “ (pails)	324	68
Hard cured smoked round herring (boxes)	277,943	136,709
Oysters inspected (bbls.)	12,964	14,903
“ “ (boxes)	6,675	3,142
“ “ (half-bbls.)	249	282
Frozen smelts inspected (boxes)	364,091	432,177
Dried fish inspected (pounds)	890,852	90,000

ILLEGAL FISHING

Regulations were generally well observed during the year. Because of several factors there was less incentive to poach than in 1939. The statement below shows a considerable decrease in the number of prosecutions and confiscations:—

	Prosecutions		Confiscations	
	1940	1939	1940	1939
Nova Scotia.....	52	96	306	374
New Brunswick.....	60	140	192	358
Prince Edward Island.....	38	20	57	78
Magdalen Islands.....			3	2
	150	256	558	812

REDUCTION OF FISH WASTE AND COARSE FISH

During the year fifteen firms in the division produced fish meal and oil. Of these, ten were located in Nova Scotia, four on the Bay of Fundy shore of New Brunswick and one on the New Brunswick north shore. The following quantities of fish meal and oil were produced:—

	‡Quantity	‡Value
		\$
Fish meal.....	7,200 tons	374,048
Cod oil.....	67,002 gals.	72,049
Medicinal oil.....	32,407 “	44,291
Herring oil.....	150,023 “	22,850
Seaweed meal.....	40 tons	1,200
Glue.....	60,380 gals.	103,926
Fertilizer.....	289 tons	2,312
Herring scales.....	908 cwts.	1,355

‡ The figures include the production of the firms referred to above, but do not represent the total quantity of oil produced in the division.

LOSS OF LIFE

It is regretted that thirty-seven fishermen lost their lives during the year in the course of their work. Thirty-one were from Nova Scotia, three from New Brunswick and three from Prince Edward Island. The fishermen lost while fishing out of Nova Scotia include five men, natives of Newfoundland, who were aboard the schooner *Bluebeard*, *Glance Bay*, which disappeared in a storm on October 22.

LOSS OF GEAR

The estimated value of the fishing equipment destroyed by accident and storms during the year was \$318,000.

COLLECTION SERVICE

The fresh fish collection service on the Guysboro coast was again operated, the results however were disappointing as a number of places formerly shipping through the service did not do so, largely because of the movement of men from these communities to work on military projects in 1940.

FISHING FLEETS

In Cape Breton Island the fishing fleet was smaller than in 1939, a decrease of 39 vessels and 88 boats being noted. Sixteen new boats and one vessel were built during the year. Only one trawler operated during the year with all landings being made at Halifax. A total of twenty-two power vessels landed at Halifax and Canso. There were two new vessels built at Lunenburg and one in Shelburne. The Lunenburg salt fishing fleet—19 vessels as compared with 22 in 1939—made its regular trips to the banks and the table below will show that landings were below those of the preceding year.

Trip	1940		1939	
	Vessels	Quintals Landed	Vessels	Quintals Landed
Frozen baiting.....	9	6,400	14	12,100
Spring.....	11	9,200	17	17,000
Summer.....	19	54,750	22	60,000
Fall.....	1	1,500	1	500
.....		71,850	.....	89,600

There was an increase of six boats in the scallop fleet operated out of Digby. More favourable marketing conditions obtained in this industry than in the season before.

There were few changes in the New Brunswick fleet. The salmon fleet was reduced from 192 to 181 boats, while the cod fleet was increased from 102 to 128 vessels. In Gloucester county a few vessels which had been idle for many years were put in operation as a result of improved market conditions for fresh and salted cod.

EDUCATIONAL WORK

Reports received from the various officers indicated the wide extent to which educational work is being carried on among the fishermen and dealers. In addition to the work done by the permanent officers the department sent instructors into various Atlantic Coast areas to show the fishermen the best

methods of curing cod in pickle, processing boneless fish and preparing dried cod. The assistance rendered by these men has been of great benefit to organized groups of fishermen and to dealers. Organized groups of fishermen continue to prove that they can, by united action, improve both their financial and social conditions immeasurably. The department's officers have assisted where possible in the organization, production and marketing problems of these groups.

Particular attention was given to the lobster canning industry by the staff of the Atlantic Fisheries Experimental Station in co-operation with the officers of the department. Eleven conferences for lobster canners were held by members of the station staff at points in Nova Scotia, New Brunswick and Prince Edward Island. These conferences consisted of discussions of lobster canning principles and methods, and practical demonstrations of lobster canning.

In Prince Edward Island, St. Dunstan's University carried on a short course for fishermen under the Youth Training program.

In addition to the foregoing work large numbers of circulars and pamphlets dealing with lobster canning, fish curing and the necessity of sterilization of fish curing sheds and boats were distributed by the officers of the division to help fishermen in producing a better quality cure and pack.

CHANGES IN STAFF

A number of changes in staff took place in the Division during the year. Major D. H. Sutherland, Chief Supervisor, was appointed Assistant Deputy Minister and transferred to Ottawa. Col. A. L. Barry, then District Supervisor in District No. 2, New Brunswick, was promoted to the position of Chief Supervisor.

I regret to report the death of R. S. Shreve, who was for many years employed in the divisional headquarters at Halifax. Miss Alice L. Power, of the Halifax office staff, retired from the service on her marriage in July. L. J. Sidebottom retired from the service on appointment as clerk in the Department of Transport.

Inspectors A. MacDonald and E. G. Giles were required for service with their respective military units and were replaced by two guardians who will carry on until the inspectors return. Inspector B. Hunter, of Annapolis, was also required for military service and a similar replacement was made.

F. A. Batson, Inspector for the Campobello-West Isles district, New Brunswick, died very suddenly in August. No appointment has as yet been made to fill this vacancy. Mr. J. F. Calder, Supervisor in District No. 1, New Brunswick, retired from the service in November and Inspector F. E. Justason was promoted to succeed him.

In the eastern section of New Brunswick Inspector T. C. Collette was promoted to the post of District Supervisor succeeding the undersigned in that position. On Prince Edward Island Inspector L. J. Murphy was transferred to West Prince County to replace Inspector C. R. Palmer, who was released for military duties.

APPENDIX No. 2

**ANNUAL REPORT OF THE CHIEF SUPERVISOR OF FISHERIES
(MAJOR J. A. MOTHERWELL) WESTERN DIVISION
(BRITISH COLUMBIA) FOR 1940**

Total pack of all varieties of canned salmon for the year amounted to 1,467,227 cases, which is a reduction of 71,830 cases as compared with the pack of the previous year, and compares with an average annual total of 1,620,863 cases during the past five years, as shown by the following figures:

1921-1925	1,340,735 cases
1926-1930	1,816,763 "
1931-1935	1,228,631 "
1936-1940	1,620,863 "

The reduction in the 1940 total is due largely to a drop in pink output which was over fifty per cent, approximately, of the pack of the brood year 1938. The reason for this year's small pack is unknown as the conditions on the spawning grounds in the brood year were such as to justify expectations of a pack equal at least to that of 1938.

SOCKEYE

The total of 366,403 cases of sockeye compares with an average of 364,908 cases during the past five years, and can be considered as satisfactory, although larger returns were expected in one or two of the areas. The five-year average packs since 1921 are as follows:

1921-1925	312,083 cases
1926-1930	321,510 "
1931-1935	312,450 "
1936-1940	364,908 "

Naas River Area.—The total pack of 13,810 cases of sockeye compares with 28,562 cases in 1936 and 12,712 cases in 1935. The predominant ages of sockeye in the Naas area are four and five years. No doubt this year's total would have been somewhat greater had it not been that the run was evidently early and well under way by the opening fishing date of July 1. Undoubtedly quite a large portion of the run had passed above the commercial fishing boundary before the opening date, although definite confirmation is difficult as it is not feasible to provide an adequate examination of all the salmon spawning grounds of the Naas area, due to the difficult, rugged and dangerous nature of the country.

A considerable portion of the catch in the Naas area was canned on the Skeena river.

Skeena River Area.—The total pack of 116,505 cases of sockeye was the largest since 1924, with the exception of 1930, when the total amounted to 130,952 cases. Notwithstanding the most satisfactory catch, the spawning grounds of the Skeena River watershed received a splendid seeding. In this connection it is interesting to remember that 1940 is the first year that results could be expected from the lowering of the fishing boundary on the Skeena River in 1936.

Rivers and Smiths Inlets.—The total pack of 89,142 cases of sockeye compares with 59,138 cases in 1936 and 166,686 cases in 1935, respectively. The escapement to the spawning grounds was rather better than expected, but undoubtedly shows the result of the severe freshets in 1936 which would affect

the four-year old sockeye. There seems reason to believe that the position of the present boundary towards the head of Rivers Inlet, the very deep water in the rest of the inlet, and the greatly increased number of power boats, are strong factors in the satisfactory escapements of recent years to the headwaters of this particular system. The present boundary is well out in deep water and the salmon have ample opportunity to pass safely above the fishing boundary to the shallower waters beyond.

The boundary at Quashela Creek in Smiths Inlet is also well placed and there should be no difficulty in obtaining a reasonable escapement at this point.

In the year under review there were 1,896 power boats licensed for the two inlets and when these are massed in the inlets at the beginning of each week particularly, following the weekly closed season, the disturbance caused by the propellers and engines must have the effect of causing the salmon to swim so deep that a greater percentage now passes under the nets than when sail boats or row boats were used.

The fishermen complain bitterly of the small results, financially, obtained in Rivers Inlet particularly. In their opinion the fishery at this point appears to have been a failure but by reference to this year's pack figures and the reports from the spawning grounds it will be appreciated that the run was far from being a failure. The difficulty lies in the fact that there are far too many fishermen operating in this confined space.

It is interesting to remember that years ago there was a boat rating set for Rivers and Smiths Inlets, that for the former being 700 boats and for the latter 115. Incidentally, these were all sail or row boats. This year there were 1,896 boats licensed for the two inlets, most of them power boats. The fishermen cannot expect to receive the same returns under present conditions as when the numbers operating were so much smaller.

In this connection the following will be found of interest:—

Sockeye pack, Rivers and Smiths Inlets, 1940.....	89,142 cases
At 13 fish to case would equal.....	1,158,846 fish
Boats licensed 1940	1,896
Average catch per boat.....	611 fish
At 35c. per fish.....	\$214
Old Rivers Inlet boat rating 700 and Smiths Inlet rating 115, totalling	815
Under old conditions with the same catch of salmon 815 boats would have averaged	1,422 fish
which, at 35c. per fish would have produced.....	\$498
Number of sockeye gillnet fishing days in 1940.....	26

Fraser River Area.—The total pack of 86,215 cases of sockeye, exclusive of fish equalling 4,536 cases exported fresh to the United States for canning purposes, compared with previous brood years as follows:—

1904	72,688 cases
1908	63,126 "
1912	108,784 "
1916	27,394 "
1920	44,598 "
1924	36,200 "
1928	26,530 "
1932	83,447 "
1936	164,408 "

The above would appear to show that the run of this cycle has made a substantial recovery.

It will be remembered that in 1936 an unexpectedly large run of excellent quality sockeye reached the Fraser River. It was felt, however, that the toll taken of this run by the commercial fishermen was far too great, if it was to be maintained. In the year under review, therefore, for the primary purpose of

conserving this run, the weekly closed season was increased in District No. 1 area by another full day, or, in other words, fifty per cent, during the period in which in 1936 this particular run passed through the commercial fishing area of the district. At the same time, due to the unusually intensive fishing by means of purse-seines in Johnstone Straits, an extra day was added also to the weekly closed period in that area. The results of this extra conservation measure were so apparent each week-end that it was felt desirable to continue the extended closure, even after the particular sockeye run had passed, in order to provide for a reasonable escapement of other species to the spawning grounds. One outstanding result of these measures was the increase of spawning sockeye on the important Chilco Lake area, for instance, by over 200 per cent, as compared with the spawning of the brood year of 1936.

SPRINGS

The trolling for spring salmon was rather disappointing, particularly for the early runs. It is interesting to note, however, that although there appeared to be a scarcity on the usual banks well off shore, fishing by the small boats whose operations were confined to the shore areas on the west coast of Vancouver Island was surprisingly good. It is felt that this situation was due to the unusual abundance of immature pilchards found in the inshore waters.

COHOES

The run of coho salmon encountered by the fishermen operating well off shore is described by the trollers as the largest ever observed, and heavy catches were made by Canadian fishermen. It would appear, however, that no considerable portion of this run was heading for Canadian spawning streams as no unusual quantities were observed by the inspecting officers.

The total coho pack was 201,467 cases, compared with a yearly average for the past five seasons of 199,631 cases.

Substantial quantities of this variety of salmon were placed in cold storage with the expectation that a good market would be available in the United Kingdom.

The following statement shows the five-year average packs during the past twenty years:—

1921-1925	127,325 cases
1926-1930	159,408 "
1931-1935	157,336 "
1936-1940	199,631 "

PINKS

The pack of pinks was extremely disappointing, only 213,911 cases, as compared with 400,876 cases in the brood year of 1938 and the last two-year average of 417,253 cases.

It is impossible to account for this small pack as there was every reason to believe, from the condition of the spawning beds in 1938, that there would be a good return in 1940.

The following statement gives the two-year averages during the past fourteen years:—

1927-1928	519,989 cases
1929-1930	794,953 "
1931-1932	215,355 "
1933-1934	483,961 "
1935-1936	533,249 "
1937-1938	493,226 "
1939-1940	417,253 "

DEPARTMENT OF FISHERIES

CHUMS

The pack of 643,443 cases of chums was the largest since 1928 and compares with an average during the past four years of 523,385 cases, according to the statement immediately following:—

1921-1925	385,213 cases
1926-1930	590,684 "
1931-1935	315,835 "
1936-1940	523,385 "

There is some fluctuation in the demand from year to year of chum salmon, and this, no doubt, has been a factor in the irregularity of packs during the past twelve years. The war conditions undoubtedly are responsible for the intensity of fishing this year, resulting in the large pack.

SALMON—GENERAL

No licences for dry salting operations of chum salmon were issued by the Provincial Government this year.

The number of sockeye salmon required to fill a forty-eight one-pound tall case, in the several fishing areas, in 1940, was as follows:—

Naas	10.17
Skeena	12.48
Rivers Inlet	12.61
Bella Coola	14.11
Butedale	13.91
Fraser	11.85

CANNED SALMON INSPECTION

The results of the year's inspection of canned salmon at the Inspection Laboratory are as follows:—

Number of inspections made.....	2,720
Total number of cases inspected.....	1,470,144½
Total number of cases below certificate standard.....	17,841
Total number of cases available for certificates.....	1,452,303½

DETAILS OF CANNED SALMON INSPECTION ACCORDING TO SPECIES

Species	Number of Cases Inspected	Number of Cases Below Certificate Standard	Number of Cases Eligible for Certificates
Sockeye.....	362,662	8,396	354,266
Springs.....	17,239½	57	17,182½
Steelheads.....	1,154	.....	1,154
Bluebacks.....	24,770½	193	24,577½
Coho.....	206,672	1,609	205,063
Pinks.....	217,587	3,486	214,101
Chums.....	640,059½	4,100	635,959½
Totals.....	1,470,144½	17,841	1,452,303½

PARTICULARS OF NON-CERTIFIED CANNED SALMON ACCORDING TO SPECIES

Species	Below Grade B	Grade B	Tips and Tails	Minced, Flakes, etc.	Totals
Sockeye.....	16½	2,057½	4,142	2,180	8,396
Springs.....	.....	57	.....	.....	57
Steelheads.....	.....	.....	.....	.....	.....
Bluebacks.....	.....	13	113	67	193
Coho.....	93	461	926	129	1,609
Pinks.....	11	2,590½	814½	70	3,486
Chums.....	.....	3,298½	801½	.....	4,100
Totals.....	120½	8,477½	6,797	2,446	17,841

The report of the Senior Chemist at the Laboratory, covering the year's work, will be found in Appendix No. 5.

The inspection fees collected at the rate of one-half cent per case totalled \$7,191.54.

SALMON TAKEN BY INDIANS OF THE PROVINCE FOR PURPOSES OF THEIR OWN

FOOD SUPPLY, UNDER FREE PERMIT

It is the custom to permit Indians, in certain areas, to fish for their own food purposes and take salmon above the tidal boundaries, as well as in tidal waters, under special permit. Whilst the quantity of fish caught under these permits in recent years has not been as large as heretofore, due largely to the fact that many Indians now find work in logging camps and other occupations, where white men are employed, the toll taken is considerable and important, particularly when the fish are caught in the vicinity of the spawning beds. Each year an endeavour is made to further reduce the quantities, particularly of the valuable sockeye species, taken in the Fraser river watershed, and it is hoped that the catches may be further reduced without any hardship to the Indians, but with considerable advantage to the fishery.

The following statement gives details of the quantities of the several varieties taken during the year:—

—	Sockeye	Springs	Coho	Pinks	Chums	Steel-head	Total
<i>District No. 1—</i>	(fish)	(fish)	(fish)	(fish)	(fish)	(fish)	(fish)
Prince George.....	417	325					742
Quesnel.....	14,717	224					14,941
Kamloops.....	1,221	829	465				2,515
Hope.....	1,225	885	930			450	3,490
Squamish.....	23,804	2,173	734				26,711
North Vancouver.....			108		1,190		1,298
Chilliwack.....	5,700	2,555	3,580		4,120	1,925	17,880
Lower Mainland.....	1,500	970	1,375		2,775	960	7,580
	48,584	7,961	7,192		8,085	3,335	75,157
<i>District No. 2—</i>							
Upper Skeena.....	146,617	4,110	15,425	9,450	50	1,817	177,469
Lower Skeena.....	750	250	3,750		833		5,583
North Q.C. Islands.....	2,400			1,500	4,375		8,275
South Q.C. Islands.....	3,600				1,875		5,475
Naas River.....	33,000	1,500	8,750	2,500	5,000		50,750
Grenville-Princepe.....	2,367		588	100	1,567		4,622
Butedale.....	500	175	5,250	2,000	4,917		12,842
Bella Bella.....	500		500		6,250		7,250
Bella Coola.....	1,667	875	938		3,750	1,500	8,730
Rivers Inlet.....	3,900				750		4,650
Smiths Inlet.....					2,250		2,250
	195,301	6,910	35,201	15,550	31,617	3,317	287,896
<i>District No. 3—</i>							
Cape Scott-Tuna Point.....	5,600	130	1,960	1,725	9,840		19,255
Tuna Point-Shelter Point.....	120	330	2,050	1,700	16,000		20,200
George Point-Cower Point.....	420	45	4,600	2,200	25,400		32,665
Shelter Point-French Creek.....			60	220	1,265		1,545
French Creek-Shoal Harbour.....		570	5,600	160	41,000		47,330
Shoal Harbour-Sombrio Point.....			550		3,700		4,250
Sombrio Point-Pachena Point.....	3,050	180	1,220	250	20,400		25,100
Barclay Sound-Point Alberni.....	1,429	1,650	1,600		23,600		28,279
Wreck Bay-Estevan Point.....	220	460	740		8,300		9,720
Estevan Point-Tatchu Point.....	305	290	215		2,695		3,505
Tatchu Point-Cape Cook.....		289	135		2,760		3,184
Cape Cook-Cape Scott.....		170	210	620	1,325		2,325
	11,144	4,114	18,940	6,875	156,285		197,358

DEPARTMENT OF FISHERIES

SALVAGING OF SALMON FRY

It is estimated that 1,625,034 salmon fry of the several species, found stranded in the various streams during the year, have been rescued and released unharmed in deep water, as shown by the following statement:—

	Method	Coho	Chums	Springs	Steel-head	Total
<i>District No. 1—</i>						
Squamish.....	Netting	500				} 1,950
Squamish.....	Ditching	150		1,300		
Chilliwack.....	Netting	15,800	3,750			} 23,050
Chilliwack.....	Ditching	2,800	700			
<i>District No. 3—</i>						
Nanaimo.....	Netting	594,150	136,700			730,850
Cowichan.....	Netting	37,999	515,243	20,543	1,499	575,284
Comox.....	Netting	32,600				32,600
Alberni.....	Netting	151,000				151,000
Chemainus.....	Netting	10,300	100,000			110,300
Totals.....		845,299	756,393	21,843	1,499	1,625,034

FISH CULTURE

A further collection of 980,000 sockeye eggs was made at Anderson Lake for the purpose of the final planting of the four-year cycle at Maggie Lake. It was found, however, after this collection, that there were so few spawners left for the natural seeding of the Anderson Lake area that it was undesirable to transfer the eggs taken and they were planted in the eyed condition, under favourable conditions, in the area where collected.

FISHERIES ENQUIRY

The enquiry regarding the desirability of continuing the use of salmon trap-nets in the Sooke area, and salmon purse-seines in Area No. 17, in that portion of the Gulf of Georgia between the mouth of the Fraser River and the international boundary to the south, known as Salmon Seining Area No. 17, was completed by the commissioner, the Honourable Gordon McG. Sloan, and his report was submitted to the Minister under date of the 16th April, 1940. The findings, in brief, were as follows:—

Salmon Traps.—"It is my conclusion that the slight benefit to be conferred on each gillnet and purse-seine fisherman by the abolition of the traps, would be outweighed by the irretrievable loss suffered by the fishermen and the general community at Sooke.

"It follows in my opinion that upon the evidence before me, and for the main reasons hereinbefore stated, it is not in the public interest to abolish trap fishing in the Sooke area."

Salmon Purse-seines, Area No. 17.—"Bearing in mind the economic and other factors to be considered and in the light of the circumstances surrounding the entry of purse-seiners into Area 17, and the evidence adduced, I

would recommend that purse-seining be prohibited in Area 'X' and a small section of Area 'Y' on Exhibit 56; and to compensate the purse-seiners for the loss of said Area 'X' and that small section of Area 'Y', would extend the purse-seining area to include a portion of Area 'Z' on Exhibit 56. I recommend that the boundaries of Area 17 be adjusted accordingly, and upon Exhibit 56, I have drawn a heavy black line in a northwesterly direction from the point at which the international boundary line meets the 49th parallel to an island lying to the north of Gabriola Pass. It is my opinion that such heavy black line should represent the easterly boundary of Area 17, and that purse-seining be prohibited to the east thereof. If there is any practical difficulty in defining that line by buoys, lights, or beacons, then I would suggest that the easterly boundary be that which the Supervisor of Fisheries deems practicable, without departing from the basic essentials of my recommendation. The area I suggest be left open to purse-seiners comprises the greater part of those clear water areas into which they were desirous of being admitted in 1933.

"I also recommend that an effort be made by the department to arrange night anchorage for the purse-seine fleet so that such place of anchorage will not interfere with the gillnet drifts, and which will in addition, obviate so far as possible, the present danger of gillnet destruction by travelling purse-seiners and packers."

POWER BOATS—SALMON GILLNET FISHING

Statement No. 14 gives the number of power boats used in actual salmon gillnet operations.

HALIBUT

There was a small increase in halibut landings at British Columbia ports this year over the figures for the previous year, the total being 239,043 hundred-weights, compared with 227,188 hundredweights in 1939. The landings during the year under review, however, were the largest since 1930, as shown by the following statement:—

Year	Vancouver and New Westminster	Prince Rupert	Bute- dale Namu Area	District No. 3	Totals
	cwts.	cwts.	cwts.	cwts.	cwts.
1930.....	11,387	293,617	978	2,814	308,796
1931.....	8,498	167,757	3,627	2,123	182,005
1932.....	11,883	148,615	6,677	1,672	168,847
1933.....	13,436	144,065	10,431	2,440	170,372
1934.....	16,113	150,476	13,297	2,716	182,602
1935.....	22,351	129,586	15,713	3,493	171,143
1936.....	20,777	131,830	11,522	3,992	168,121
1937.....	23,334	147,638	12,676	3,777	187,425
1938.....	28,155	141,691	17,776	5,866	193,488
1939.....	30,225	173,857	18,651	4,455	227,188
1940.....	26,010	185,921	23,157	3,955	239,043

Due to alterations in the regulations from time to time regarding the opening and closing of halibut fishing, the following statement, giving particulars of such action since the International Fisheries Commission commenced to function, will be found of interest:—

DEPARTMENT OF FISHERIES

Fishing Permitted

1924	From January 1.....	To November 15, inclusive
1925	" February 16	" November 15, "
1926	" February 16	" November 15, "
1927	" February 16	" November 15, "
1928	" February 16	" November 15, "
1929	" February 16	" November 15, "
1930	" February 16	" November 15, "

(Voluntarily closed from Feb. 16-28, 1930)

1931 From February 16 To October 31, inclusive

(Strike from Feb. 16-28 and part March, 1931)

1932	From February 16	Areas 1 & 2 to October 22, inclusive
		" 3 & 4 to October 31, "
1933	" February 1	" 1 & 2 to August 25, "
		" 3 & 4 to October 26, "
1934	" March 1	" 1 & 2 to August 19, "
		" 3 & 4 to October 27, "
1935	" March 1	" 1 & 2 to September 6, "
		" 3 & 4 to December 26, "

*Part Area 3 to October 31, "

(All areas voluntarily closed Mar. 1-April 1, 1935)

1936	From March 16	Areas 1 & 2 to August 10, "
		" 3 & 4 to November 3, "
1937	" March 16	" 1 & 2 to July 28, "
		" 3 & 4 to October 19, "
1938	" April 1	" 1 & 2 to July 29, "
		" 3 & 4 to October 29, "
1939	" April 1	" 1 & 2 to July 29, "
		" 3 & 4 to October 28, "
1940	" April 1	" 1 & 2 to July 13, "
		" 3 & 4 to September 26, "

(First Commission regulations were issued in February, 1932. Previous closed seasons were established by treaty signed October, 1924.)

* (Between Cape St. Elias and Yakutat. Spawning area.)

HALIBUT LIVERS

Halibut liver production figures for the period 1933-40 are given in the table below. The significant point brought out by the table is the great increase in liver value per hundredweight which has taken place since 1933, although the hundredweight value for 1940 was slightly less than the average for the two or three preceding years.

Year	Cwts.	Marketed Value	Average Value per Cwt.
		\$	\$ cts.
1933.....	2,293	45,995	20 06
1934.....	1,562	36,439	23 33
1935.....	1,812	80,513	44 43
1936.....	1,916	96,311	50 27
1937.....	1,782	94,405	52 97
1938.....	3,049	155,420	50 97
1939.....	3,853	206,916	53 70
1940.....	2,265	115,098	50 81

COD LIVERS

As shown by the following table there was a further sharp increase in the quantity of cod livers marketed in 1940. Indeed the quantity was nearly twice

as great as in the year before and total marketed value was also well above the 1939 figures, although the average value of the livers per hundredweight showed a decrease. Cod liver figures for the period 1933-40 were as follows:—

Year	Cwts.	Marketed Value	Average Value per Cwt.
		\$	\$ cts.
1933.....	486	9,773	20 10
1934.....	825	16,772	20 33
1935.....	1,127	43,367	38 48
1936.....	1,430	59,654	41 72
1937.....	827	33,884	40 97
1938.....	1,403	49,368	35 19
1939.....	1,152	43,111	37 42
1940.....	2,099	58,453	27 84

SHRIMPS

No shrimps were canned during the year but 1,145 hundredweights were marketed fresh as is shown below, with certain figures for earlier years:

Year	Marketed Fresh (cwts.)	Canned (cases)
1932.....	1,109	209
1933.....	1,247	35
1934.....	933	336
1935.....	1,545	483
1936.....	646	25
1937.....	652	222
1938.....	864	460
1939.....	831	...
1940.....	1,145	...

OYSTERS

The demand for oysters from British Columbia increased greatly during the year, largely due to the check in imports of this variety of shellfish. Figures relative to the use of the catch in recent years are as follows:

Year	Marketed Fresh (bbls.)	Canned (Cases)
1930.....	3,197	....
1931.....	3,555	....
1932.....	2,010	....
1933.....	2,231	....
1934.....	2,437	860
1935.....	2,266	1,087
1936.....	2,594	3,601
1937.....	1,745	587
1938.....	1,365	1,426
1939.....	2,691	3,647
1940.....	2,813	2,346

HERRING

The total catch of herring in 1940 was 169,750·65 tons.

In District No. 1 the herring fishery is confined to gillnet operations in the vicinity of Point Grey where a selective catch is obtained for the purposes of the fresh fish market. In District No. 2 the exploitation of the fishery has not yet been sufficient to provide the necessary information required for the adoption of the quota plan, but it is expected that in the immediate future the necessary information will be available. In the greater part of District No. 3 the quota system applies.

Statement No. 8 shows the quantity of herring dry salted as 104,812 hundredweights. This is the lowest total in many years and is the result of the chaotic exchange conditions in the Orient where all the dry salt pack is marketed.

The figures given immediately below show the great increase in the pack of canned herring during recent seasons, the total for 1940 being 727,292 cases. This product is packed largely in one pound oval tins, although one pound tall and one-half pound oval tins are also used to some extent. Much of the pack is processed with tomato sauce, some with cottonseed oil, and a portion without the adding of any sauce or oil. The market is chiefly in the United Kingdom.

	Cases Canned
1934	2,295
1935 .....	.....
1936	51,695
1937	27,365
1938	23,376
1939	222,658
1940	727,292

In view of the greatly increased pack of canned herring during the past two years it is felt to be desirable to have the officers of the Canned Salmon Inspection Laboratory give some attention to the examination of this product, with a view to being prepared to include the inspection of canned herring in its functions when it is considered desirable that this product should be included under the inspection regulations. With this in mind considerable preliminary work was done during the year by the laboratory staff.

PILCHARDS

The cannery pack of pilchards for the year totalled 59,166 cases, as shown by Statement No. 9. The yearly pack totals fluctuate very materially, owing to the uncertainty of supplies of the raw product. Some years it is necessary for the Canadian fishermen to go considerable distances outside territorial waters to obtain their supplies; sometimes the quantities available even there are small.

An unusual feature of the pilchard situation during 1940 was the appearance in the fall of large quantities of immature fish in the waters all round the shores of Vancouver Island and at many points on the mainland. This is the first year when any material quantities of the young of this variety have been found in British Columbia waters.

CLAMS

The particulars of the year's clam production covering all varieties are given below:

	Marketed Fresh (cwts.)	Canned (cases)
1934	6,332	5,815
1935	15,716	10,209
1936	26,530	12,579
1937	27,018	12,587
1938	42,169	22,155
1939	21,601	5,431
1940	20,785	7,151

CRABS

The demand for the excellent British Columbia pack of canned crabs is increasing and the operations of the year produced the largest output on record. The disposition of the catch in 1940 and other recent years has been as follows:

Year	Marketed Fresh (cwts.)	Canned (cases)
1928	5,878	....
1929	5,496	671
1930	4,459	295
1931	4,968	204
1932	2,952	251
1933	3,766	999
1934	3,187	1,267
1935	4,336	1,322
1936	4,347	1,312
1937	4,948	1,546
1938	4,337	2,157
1939	6,814	2,049
1940	6,551	3,794

WHALES

Whaling was resumed in 1940, but only at one station, and resulted in a take of 220 whales divided as to species as shown in Statement No. 11.

TUNA

Tuna were first taken off the shores of British Columbia in any quantities during 1939. Fishing operations were not resumed, however, in 1940. In the former year many boats and crews were idle as a result of the failure of the pilchard run and some of these, while waiting for better pilchard conditions, experimented in tuna fishing. In 1940, however, the pilchard fleet was fully occupied in that fishery to the end of September and after that date the fall salmon fishing was found more profitable than tuna operations. A few tuna were taken incidental to salmon trolling. The total pack of canned tuna was 45 cases.

FUR SEAL SKINS

Owing to the poor market, and also perhaps because of the more strict enforcement of the regulations under the Pelagic Sealing Treaty, no fur seal skins were landed in British Columbia during the year. Information as to the landings in the 1912-1939 period can be found in the annual departmental report for the fiscal year 1939-40.

DESTRUCTION OF SEA LIONS

The practice of sending a departmental boat to the areas opposite the valuable salmon gillnet districts of Smiths Inlet and Rivers Inlet, where sea lions are very plentiful each year, was discontinued in 1940, since no suitable boat was available. Captains of departmentally-owned boats, however, are expected to destroy sea lions where they are encountered in ordinary patrol work. Rifles and ammunition are supplied for this purpose. The numbers so destroyed in 1940 were as follows:

Where destroyed	Adults	Pups	Total
Bonilla Island.....	20	.....	20
Butterworth Rocks.....	10	.....	10
North Danger Rocks.....	75	.....	75
Hecate Strait.....	20	.....	20
Thormanby Island.....	5	.....	5
Nanoose Bay.....	2	.....	2
Barclay Sound.....	2	.....	2
Totals.....	134	.....	134

HAIR SEALS

No bounty on hair seals was paid in the year under review. A statement as to bounty payments in previous years will be found in the departmental report for 1939-40.

ENGINEERING WORK

In Appendix No. 3 of this report will be found reference to the work which engaged the attention of the engineering branch of the department's British Columbia service during the year.

VIOLATIONS

There were 238 prosecutions for violation of the fishery regulations during the year, the total revenue therefrom reaching the sum of \$8,573.86. Details are as follows:

	District No. 1	District No. 2	District No. 3	Total
Prosecutions.....	58	88	92	238
Fines.....	\$ 882 00	\$ 2,643 00	\$ 2,101 00	\$ 5,626 00
Sales.....	\$ 568 49	\$ 1,960 92	\$ 418 45	\$ 2,947 86
Total Fines and Sales.....	\$ 1,450 49	\$ 4,603 92	\$ 2,519 45	\$ 8,573 86

PATROL SERVICE

A total of 115 boats were employed in the enforcement of the fishery regulations. Of these 21 were departmentally-owned and 94 chartered, as shown by the following statement:

	Number	Total
<i>Departmentally-owned:</i>		
C.G.S. <i>Kitimat</i> (diesel)	1	
District No. 1 (gas & diesel)	5	
District No. 2 (gas & diesel)	11	
District No. 3 (gas & diesel)	4	21
<i>Chartered boats:</i>		
District No. 1 (gas & diesel)	1	
District No. 2 (gas & diesel)	23	
District No. 3 (gas & diesel)	51	75
District No. 1 (row)	Nil	
District No. 2 (row)	13	
District No. 3 (row)	6	19
		<u>115</u>

The recently built diesel-powered boat, C.G.S. *Kitimat* was required to spend unusually long hours in patrol work in connection with the halibut fisheries, fur seal patrol, and the protection of Canadian harbours, as she was endeavouring to perform duties which had recently required three large boats. The total mileage logged was 19,923.

Unfortunately seaplanes were not available as usual for the protection of the fisheries, apart from an occasional flight by a 'plane of the R.C.A.F. The air patrol is the most efficient method of patrol, for supervision of purse-seining particularly.

MARINE WAYS AND REPAIR SHOP, NEW WESTMINSTER

The accommodation now provided on the Fraser river for the overhaul of the department's boats is proving very efficient and satisfactory in every way.

DEPARTMENTAL STAFF

Particulars of the personnel employed during the year are given below:

Supervisors, inspectors, and clerical staff	55
General (inspection of spawning grounds, etc.)	18
Guardians	46
Patrolmen and boat crews	167
Fish culture	3
Removal of obstructions	13
Total	302

As a result of the intensive fishing during the year, due largely to war conditions, the fisheries staff in this province were required to exert themselves even more than usual, particularly in the absence of seaplane patrol and the reduction in the number of the larger boats used for protection of halibut fishing, the protection of the three-mile limit against illegal use by foreign boats, the protection of the fur seals, and numerous other duties.

The writer, as usual, had the pleasure of again meeting practically every fishery officer in the British Columbia Fisheries Service in the year under review, and feels that the close personal contact is very much to be desired in the interests of efficiency and esprit de corps.

PROVINCIAL RELATIONS

Obviously, in view of the fact that the federal authorities have jurisdiction over the fisheries of the tidal waters only, and the British Columbia authorities over those of the non-tidal waters, and having in mind the fact that commercial fish proceed in many cases hundreds of miles into the interior, above tidal boundaries, there must be the closest of co-operation between the officers of the federal and provincial departments. The provincial authorities concerned are the provincial Department of Fisheries and the Provincial Game Commission. It is a pleasure to be able to report that the relations with these authorities have been most cordial.

SPORT FISHING

Sport fishing in the tidal waters of the province continued very attractive to the numerous residents and to tourists. Excellent catches of trout, grilse, and mature salmon were taken at practically all the usual sport fishing areas. The quantity of salmon taken in these operations is very considerable and it would seem that in considering future conservation measures for the protection of spring and coho salmon, and steelhead trout, the toll taken by sport fishermen should receive attention.

STATEMENT No. 1—ANNUAL CANNED SALMON PRODUCTION IN BRITISH COLUMBIA

Year	Num-ber of can-neries oper-ated	Number of salmon licences issued					Pack canned										Totals
		G.N. Troll	P.S.	D.S.	T.N.	Sockeye	Red Spring	Pink Spring	White Spring	Blue-back	Steel-head	Coho	Pink	Chum			
1929.....	63	5,609	2,630	371	24	7	281,306	8,295	3,156	7,926	22,246	672	174,198	477,969	424,982	1,400,750	
1930.....	59	6,061	3,115	343	21	7	477,678	20,184	6,650	11,970	42,033	1,656	148,561	1,111,937	401,114	2,221,783	
1931.....	35	4,893	3,115	228	21	7	291,464	17,526	4,727	4,894	25,296	1,326	76,879	206,995	55,997	685,104	
1932.....	44	5,359	3,033	157	30	7	284,355	46,953	14,133	14,974	28,505	1,168	160,466	223,716	306,761	1,081,031	
1933.....	49	6,113	2,880	238	31	8	258,107	12,464	1,849	5,953	21,763	1,459	137,289	532,558	293,630	1,265,072	
1934.....	49	6,826	3,099	296	9	8	377,882	15,281	1,644	12,859	29,556	1,282	195,874	435,364	513,184	1,582,926	
1935.....	43	6,216	3,107	293	9	8	350,444	10,187	3,114	8,619	15,319	596	216,173	514,966	409,604	1,529,022	
1936.....	46	6,620	3,511	287	9	7	415,024	16,493	2,527	10,834	33,718	1,068	212,343	591,532	597,487	1,881,026	
1937.....	37	6,095	3,162	291	9	5	325,774	10,963	1,788	3,420	19,236	844	113,972	585,576	447,602	1,509,175	
1938.....	38	7,125	3,453	300	9	5	447,453	10,276	2,322	2,933	27,417	1,035	273,706	400,876	541,812	1,707,830	
1939.....	35	6,502	3,947	339	9	5	269,888	10,302	2,848	2,947	48,209	797	196,887	620,505	386,584	1,539,057	
1940.....	38	6,392	3,222	350	9	5	366,403	11,868	2,856	3,017	23,277	1,205	201,467	213,911	643,443	1,467,227	

NOTE.—Licences issued include transfers from one district to another, except in the case of purse-seines after 1929

STATEMENT No. 2—PACK OF CANNED SALMON ON THE NAAS RIVER—1929 TO 1940

Year	Num-ber of can-neries oper-ated	Number of salmon licences issued					Pack canned									
		G.N.	Troll	P.S.	D.S.	T.N.	Sockeye	Red Spring	Pink Spring	White Spring	Blue-back	Steel-head	Coho	Pink	Chum	Totals
							cases	cases	cases	cases	cases	cases	cases	cases	cases	cases
*1929.....	3	240					16,347	256	57	96			1,195	10,507	1,261	29,719
†1929.....							16,077	256	57	96			1,145	10,342	1,212	29,185
*1930.....	3	282					26,500	1,722	283	176			5,555	90,163	4,330	128,916
†1930.....							26,405	1,722	283	176		84	961	79,976	3,853	113,460
*1931.....	1	235					16,929	1,010	323	106			8,943	5,178	660	33,149
†1931.....							9,146	1,010	323	106			3,443	3,575	392	14,995
*1932.....	3	278					15,138	5,848	264	468			33,495	51,920	15,070	122,226
†1932.....							14,154	3,676	264	468			7,955	44,629	14,515	85,671
*1933.....	3	297					10,173	1,014	227	214			19,016	57,406	2,778	90,942
†1933.....							9,757	885	227	184			3,251	44,306	1,775	60,434
*1934.....	3	335					36,242	533	126	145			26,698	37,698	5,558	107,311
†1934.....							28,701	383	126	145			9,935	32,965	2,648	75,214
*1935.....	3	310					12,712	94	298	168			21,810	25,508	17,481	78,214
†1935.....							12,245	86	298	168			5,125	21,443	12,681	52,189
*1936.....	3	349					28,562	1,622	229	316			11,842	72,022	20,196	135,285
†1936.....							24,137	520	188	237			8,439	60,582	16,504	111,103
*1937.....	2	321					17,590	773	245	232			12,336	7,876	10,530	49,628
†1937.....							11,630	773	245	232			3,316	5,688	6,009	24,939
*1938.....	2	309					21,746	458	189	125			20,485	61,660	15,135	119,986
†1938.....							14,795	13	165	125			3,986	29,843	6,804	55,919
*1939.....	2	289					24,425	170	389	149			3,209	29,819	2,615	60,791
†1939.....							18,834	17	297	137			1,667	19,479	1,784	42,230
*1940.....	2	254					13,810	1,258	181	275			11,447	29,893	5,461	62,445
†1940.....							8,056	118	95	99			1,975	12,151	2,149	24,750

* Pack of fish caught at Naas river regardless where canned.

† Pack of Naas river regardless where caught.

NOTE.—Licences issued, include transfers from other districts.

DEPARTMENT OF FISHERIES

STATEMENT No. 3—PACK OF CANNED SALMON ON THE SKEENA RIVER—1929 TO 1940

Year	Num-ber of can-neries oper-ated	Number of salmon licences issued					Pack canned										
		G.N.	Troll	P.S.	D.S.	T.N.	Sockeye	Red Spring	Pink Spring	white Spring	Blue-back	Steel-head	Coho	Pink	Chum	Totals	
							CASES	CASES	CASES	CASES	CASES	CASES	CASES	CASES	CASES	CASES	CASES
†1929.....	11	1,143	.....	.....	.....	.....	77,714	3,795	441	383	.....	.....	13	37,138	94,846	3,625	217,955
†1929.....	.....	.....	.....	.....	.....	.....	78,014	3,795	441	383	.....	.....	13	37,456	95,305	4,835	220,242
†1930.....	11	1,202	.....	.....	.....	.....	130,952	6,589	1,047	322	.....	.....	160	24,191	214,266	3,327	380,754
†1930.....	.....	.....	.....	.....	.....	.....	132,372	6,674	1,047	324	.....	.....	58	29,203	275,642	5,057	450,377
†1931.....	8	1,076	.....	.....	.....	.....	107,936	7,040	2,284	534	.....	.....	768	20,146	41,264	3,893	183,865
†1931.....	.....	.....	.....	.....	.....	.....	93,029	7,040	2,284	534	.....	.....	768	10,737	44,807	3,610	162,809
†1932.....	10	1,119	.....	.....	.....	.....	59,916	16,378	9,419	2,472	.....	.....	404	48,312	58,261	38,549	233,711
†1932.....	.....	.....	.....	.....	.....	.....	52,624	14,268	9,419	2,472	.....	.....	365	20,549	32,519	28,756	160,972
†1933.....	10	1,218	.....	.....	.....	.....	30,506	2,626	444	227	.....	.....	267	39,896	95,783	15,714	185,463
†1933.....	.....	.....	.....	.....	.....	.....	27,693	6,805	444	828	.....	.....	201	21,366	79,932	10,970	148,239
†1934.....	9	1,164	.....	.....	.....	.....	70,654	6,844	592	860	.....	.....	114	54,470	125,163	24,388	283,085
†1934.....	.....	.....	.....	.....	.....	.....	54,558	6,809	592	860	.....	.....	131	21,298	27,628	6,242	118,118
†1935.....	9	1,053	.....	.....	.....	.....	64,140	3,443	429	188	.....	.....	12	45,512	99,412	31,807	244,943
†1935.....	.....	.....	.....	.....	.....	.....	52,879	3,422	429	188	.....	.....	14	23,498	81,868	8,122	170,420
†1936.....	8	970	.....	.....	.....	.....	97,823	4,883	455	435	.....	.....	33	55,198	178,299	36,892	374,018
†1936.....	.....	.....	.....	.....	.....	.....	81,960	3,781	414	356	.....	.....	33	32,142	92,997	15,343	227,026
†1937.....	7	850	.....	.....	.....	.....	55,811	3,788	382	315	.....	.....	21	34,502	72,455	37,431	204,705
†1937.....	.....	.....	.....	.....	.....	.....	41,023	3,704	382	315	.....	.....	21	14,573	57,623	10,027	127,668
†1938.....	6	1,049	.....	.....	.....	.....	73,508	3,361	1,165	259	.....	.....	42	100,658	146,676	34,785	360,454
†1938.....	.....	.....	.....	.....	.....	.....	46,988	2,916	1,141	259	.....	.....	42	38,542	69,299	14,668	173,855
†1939.....	6	844	.....	.....	.....	.....	96,358	3,277	1,488	348	.....	.....	55	48,973	127,521	15,666	293,686
†1939.....	.....	.....	.....	.....	.....	.....	68,388	3,124	1,396	336	.....	.....	55	27,115	91,559	6,360	198,333
†1940.....	7	926	.....	.....	.....	.....	133,854	5,884	1,113	571	.....	.....	133	62,516	91,612	62,114	359,797
†1940.....	.....	.....	.....	.....	.....	.....	116,505	4,708	1,017	396	.....	.....	130	19,196	46,687	4,684	193,323

† Pack of fish caught at Skeena river regardless where canned.

‡ Pack at Skeena river regardless where caught.

NOTE.—Licences issued include transfers from other districts.

STATEMENT No. 4—PACK OF CANNED SALMON FROM FISH CAUGHT AT RIVERS INLET AND SMITHS INLET—1929 TO 1940

Year	Num-ber of can-eries oper-ated	Number of salmon licences issued				Pack canned										
		G.N.	Troll	P.S.	D.S.	T.N.	Sockeye	Red Spring	Pink Spring	White Spring	Blue-back	Steel-head	Coho	Pink	Chum	Totals
						cases	cases	cases	cases	cases	cases	cases	cases	cases	cases	cases
1929	13	1,577					79,548	546	215	127		47	8,270	3,112	6,536	98,401
1929							77,669	140	239	107		41	8,239	1,940	83,866	
1930	12	1,833					150,398	614	333	229		182	6,760	17,476	18,372	194,414
1930							141,684	275	333	215		208	2,084	34,638	2,135	181,232
1931	5	1,433					92,872	218	61	183		69	5,536	2,296	544	101,779
1931							80,732	200	82	165		68	6,683	3,724	562	92,216
1932	10	1,754					76,110	405	236	145		56	11,871	4,305	5,516	108,644
1932							85,358	128	236	143		49	7,335	4,631	1,109	98,389
1933	11	1,962					119,548	606	108	243		153	9,078	11,658	8,932	150,226
1933							114,045	454	108	241		169	8,514	25,054	9,518	158,103
1934	11	2,318					89,575	532	82	129		121	11,862	2,928	14,375	119,604
1934							82,828	390	82	128		122	8,793	9,769	16,444	118,556
1935	8	2,023					166,686	138	352	155		63	9,576	8,966	19,563	205,499
1935							120,531	94	306	146		49	917	6,045	7,128	144,216
1936	8	2,210					59,138	317	132	162		60	7,432	6,497	13,158	86,896
1936							42,803	315	151	148		54	7,683	17,254	10,921	79,309
1937	6	1,875					108,170	377	396	235		75	6,374	7,973	18,894	142,494
1937							91,299	235	452	233		76	5,331	18,873	21,931	138,631
1938	6	2,261					122,093	744	181	359		169	17,527	10,827	15,832	167,732
1938							86,490	716	136	351		99	14,284	12,447	17,102	131,235
1939	4	1,817					71,068	412	206	329		133	16,125	14,580	7,437	110,290
1939							36,937	235	32	306		82	6,202	19,256	4,903	68,103
1940	4	1,896					89,142	810	238	320		91	12,744	4,085	15,167	122,618
1940							48,535	494	101	294		40	7,452	4,915	2,369	63,600

NOTE.—Figures shown in roman are packs from fish caught at Rivers Inlet or Smiths Inlet. Figures shown in italics are actual packs irrespective of where fish taken and not including fish shipped out for canning in other districts. Licences issued include transfers from other districts.

STATEMENT No. 5.—PACK OF CANNED SALMON IN THE FRASER RIVER DISTRICT—1929 to 1940

Year	Num-ber of can-eries oper-ated	Number of salmon licences issued					Pack canned										Totals	
		G.N.	Troll	P.S.	D.S.	T.N.	Sockeye	Red Spring	Pink Spring	White Spring	Blue-back	Steel-head	Coho	Pink	Chum			
							cases	cases	cases	cases	cases	cases	cases	cases	cases	cases	cases	cases
1929.....	9	1,473	113	.....	.....	.....	60,407	2,984	912	5,977	11,060	53	40,540	158,200	144,208	425,331	
1930.....	8	1,523	115	.....	.....	.....	107,896	8,300	3,066	9,761	27,857	22	25,535	30,754	68,946	282,137	
1931.....	7	1,358	154	.....	.....	.....	54,688	5,970	1,185	3,187	14,697	4	13,468	21,534	948	115,681	
1932.....	8	1,446	166	.....	.....	.....	85,447	19,994	3,622	11,020	16,558	23	28,685	9,813	45,100	218,262	
1933.....	10	1,685	110	64	.....	.....	53,481	5,701	426	4,554	13,299	.....	25,715	143,058	77,330	323,564	
1934*.....	11	1,803	98	105	.....	.....	145,579	5,495	263	11,072	22,566	.....	30,751	35,847	219,331	470,904	
1934†.....	.....	.....	.....	.....	.....	.....	133,159	4,713	173	10,760	1,607	.....	10,991	342	103,081	264,826	
1935*.....	10	1,663	124	108	.....	.....	76,415	5,181	326	6,783	7,701	.....	63,933	182,528	72,353	415,220	
1935†.....	.....	.....	.....	.....	.....	.....	57,212	4,205	212	4,984	350	.....	24,600	111,328	8,227	211,118	
1936*.....	11	1,784	118	.....	.....	.....	165,651	7,128	461	8,426	20,647	6	51,243	23,842	188,538	465,942	
1936†.....	.....	.....	.....	.....	.....	.....	164,408	6,680	310	8,142	.....	.....	22,572	2	30,663	232,777	
1937*.....	10	2,082	190	58	.....	.....	103,137	3,877	226	1,940	19,065	15	25,618	252,416	119,254	525,548	
1937†.....	.....	.....	.....	.....	.....	.....	66,583	3,622	84	1,738	1,354	15	11,242	87,897	20,934	193,469	
1938*.....	.....	2,319	190	112	.....	.....	217,882	4,592	413	1,532	21,923	72	54,314	29,862	181,444	512,034	
1938†.....	.....	.....	.....	.....	.....	.....	169,430	3,754	32	508	.....	13	28,687	63	49,835	252,322	
1939*.....	10	2,161	210	.....	.....	.....	73,216	5,092	475	1,511	32,833	86	48,120	204,681	143,020	509,034	
1939†.....	.....	.....	.....	.....	.....	.....	43,294	4,466	448	1,094	8,428	69	17,144	108,608	42,480	225,986	
1940*.....	10	2,237	212	.....	.....	.....	121,080	4,036	311	1,042	13,627	178	47,397	13,243	178,860	379,774	
1940†.....	.....	.....	.....	.....	.....	.....	86,215	3,411	279	770	.....	144	12,369	12	40,056	143,256	

* Represents actual pack, regardless where caught.

† Represents pack of Fraser fish, regardless where canned.

NOTE.—Licences issued include transfers from other districts.

1936† pack of Sockeye on Fraser, 164,408 cases, does not include 16,611 cases Sockeye caught on Fraser and exported and canned in Puget Sound canneries.

1940† pack of Sockeye on Fraser, 86,215 cases, does not include 4,536 cases Sockeye caught on Fraser and exported and canned in Puget Sound canneries.

STATEMENT No. 6—PACK OF CANNED SALMON OF PUGET SOUND, U.S.A., FROM
1929 TO 1940

Year	Number of canneries operated	Spring	Sockeye	Coho	Chum	Pink	Steel- head	Total
		cases	cases	cases	cases	cases	cases	cases
1929.....	21	32,600	111,855	101,363	150,867	727,748	280	1,124,713
1930.....	13	29,378	352,194	122,691	64,234	3,712	397	572,606
1931.....	18	28,066	83,728	76,025	55,189	705,580	293	948,881
1932.....	10	23,964	78,319	60,740	146,151	1,677	60	310,911
1933.....	19	20,869	125,738	44,568	37,039	543,340	222	771,776
1934.....	20	14,398	352,579	69,254	73,337	3,606	.....	513,174
1935.....	14	9,737	54,677	71,985	15,604	377,445	.....	529,448
1936.....	9	6,328	59,505	29,119½	80,831½	1,345	.....	177,201
1937.....	14	8,968	60,259	32,559	17,417	327,833	.....	447,036
1938.....	13	2,787½	134,651	9,800½	7,852½	193	.....	155,304½
1939.....	14	2,439	43,511	54,773	14,505	275,485	.....	390,713
1940.....	9	1,991	63,890	30,487½	21,618	2,732	.....	120,718½

STATEMENT No. 7—STATEMENT OF HALIBUT LANDINGS—BRITISH
COLUMBIA—1913 TO 1940

(Includes landings in United States bottoms)

	Cwt.		Cwt.
1913.....	223,465	1927.....	271,354
1914.....	214,444	1928.....	302,820
1915.....	194,896	1929.....	304,364
1916.....	123,062	1930.....	254,796
1917.....	113,529	1931.....	182,005
1918.....	186,229	1932.....	168,847
1919.....	210,777	1933.....	170,372
1920.....	238,770	1934.....	182,602
1921.....	325,868	1935.....	171,143
1922.....	293,184	1936.....	168,121
1923.....	334,667	1937.....	187,425
1924.....	331,382	1938.....	193,438
1925.....	318,240	1939.....	222,188
1926.....	315,095	1940.....	235,371

STATEMENT No. 8—STATEMENT OF DRY SALT HERRING PACKS, 1918-1940—
BRITISH COLUMBIA

Year	District No. 1	District No. 2	District No. 3		Total
			East Coast	West Coast	
	cwt.	cwt.	cwt.	cwt.	cwt.
1918.....	20,000	.....	109,900	42,710	172,610
1919.....	4,000	.....	43,000	208,058	255,058
1920.....	807	1	176,640	334,710	512,168
1921.....	249	.....	231,240	248,432	479,971
1922.....	.....	.....	297,871	224,897	522,768
1923.....	.....	8,935	250,420	484,681	744,036
1924.....	.....	.....	305,266	548,277	853,543
1925.....	.....	4,120	591,162	487,892	1,083,174
1926.....	11,134	4,192	596,114	327,207	938,647
1927.....	24,380	7,600	542,385	473,825	1,048,190
1928.....	46,995	.....	748,032	277,161	1,072,188
1929.....	78,800	5,160	691,673	140,751	916,384
1930.....	19,114	.....	546,342	240,517	805,973
1931.....	.....	.....	668,506	119,721	788,227
1932.....	.....	.....	219,398	50,022	269,420
1933.....	.....	.....	448,944	64,080	513,024
1934.....	.....	.....	310,026	104,600	414,626
1935.....	.....	.....	280,290	22,420	302,710
1936.....	.....	.....	357,337	26,000	383,337
1937.....	.....	.....	203,401	.....	203,401
1938.....	.....	.....	149,700	.....	149,700
1939.....	.....	.....	160,315	.....	160,315
1940.....	.....	.....	104,812	.....	104,812

DEPARTMENT OF FISHERIES

STATEMENT No. 9—CANNED PILCHARD PACK—BRITISH COLUMBIA—1917 TO 1940

	Cases		Cases
1917.....	1,090	1929.....	98,821
1918.....	63,693	1930.....	55,166
1919.....	63,065	1931.....	17,336
19 0.....	91,929	1932.....	4,622
1921.....	16,091	1933.....	2,946
1922.....	19,186	1934.....	35,437
1923.....	17,195	1935.....	27,184
1924.....	14,898	1936.....	35,007
1925.....	37,182	1937.....	40,975
1926.....	26,731	1938.....	69,374
1927.....	58,501	1939.....	7,300
1928.....	65,097	1940.....	59,166

STATEMENT No. 10—PRODUCTION FISH OIL AND MEAL—BRITISH COLUMBIA, 1920-1940

Year	From Pilchards		From Herring		From Whales			From Other Sources*	
	Meal and fertilizer	Oil	Meal	Oil	Whale-bone and meal	Fertilizer	Oil	Meal and fertilizer	Oil
	tons	gals.	tons	gals.	tons	tons	gals.	tons	gals.
1920.....					503	1,035	604,070	466	55,669
1921.....								489	44,700
1922.....					326	230	283,314	911	75,461
1923.....					485	910	706,514	823	180,318
1924.....					292	926	645,657	1,709	241,376
1925.....	2,083	495,653			347	835	556,939	2,468	354,853
1926.....	8,481	1,898,721	310	13,700	340	666	468,206	1,752	217,150
1927.....	12,169	2,673,876	1,838	170,450	345	651	437,967	2,512	375,130
1928.....	14,500	3,995,806	831	68,411	376	754	571,914	3,658	411,207
1929.....	15,825	2,856,579	932	34,924	416	779	712,597	3,671	461,915
1930.....	13,934	3,204,058	915	60,373	273	581	525,533	2,420	182,636
1931.....	14,500	2,551,914	3,904	110,810				1,747	241,682
1932.....	8,842	1,315,864	6,195	186,173				413	45,517
1933.....	1,108	275,879	4,078	316,213	249	223	509,310	1,596	187,560
1934.....	7,626	1,635,123	2,570	104,710	340	631	813,724	2,458	337,025
1935.....	8,681	1,649,392	5,262	306,767	211	354	426,772	2,147	247,437
1936.....	8,715	1,217,097	10,985	782,499	332	687	763,740	3,148	335,969
1937.....	8,483	1,707,276	14,427	1,283,658	268	527	662,355	2,720	294,546
1938.....	8,891	2,195,850	9,624	929,158	273	490	543,378	2,491	228,157
1939.....	906	178,205	16,462	1,366,607				3,004	283,504
1940.....	4,853	877,556	24,264	1,700,819	181	434	361,620	3,526	285,314

* Salmon and halibut offal, gray fish, and anchovies.

STATEMENT NO. 11—NUMBER OF WHALES LANDED—BRITISH COLUMBIA, 1929-1940*

Species	1929	1930	1933	1934	1935	1936	1937	1938	1940
Sperm.....	146	147	190	265	175	311	265	252	126
Sulphur.....	16	10	1		6	3	1	4	2
Fin.....	168	62	17	71	20	48	44	50	90
Hump.....	9	12		14	1	14	7	4	2
Sei.....	67	89	1			2			
Bottlenose.....	1								
Totals.....	407	320	209	350	202	378	317	310	220

* No whaling plants operated 1931, 1932 and 1939.

STATEMENT No. 12—STATEMENT OF LICENCES ISSUED FOR SALMON CANNERIES AND SALMON FISHING GEAR (NOT INCLUDING LICENCES TO CAPTAINS AND ASSISTANTS ON SALMON SEINE-BOATS OR ASSISTANTS ON SALMON GILL-NET BOATS.) BRITISH COLUMBIA—1929-1940

Kind of Licence	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940
<i>District No. 1—</i>												
Salmon cannery.....	9	11	7	8	10	11	10	11	10	10	10	10
Salmon trolling.....	113	115	154	166	110	98	124	118	190	190	210	212
Salmon gill-net.....	1,473	1,523	1,358	1,446	1,685	1,803	1,663	1,784	2,082	2,319	2,161	2,237
<i>District No. 2—</i>												
Salmon cannery.....	45	26	21	28	29	31	26	27	20	22	18	20
Salmon purse-seine.....	153	152	71	53	55	109	102	99	82	100	98	131
Salmon drag-seine.....	9	9	9	9	11	9	9	9	9	9	9	9
Salmon trolling.....	738	891	884	875	852	937	930	964	916	958	863	737
Salmon gill-net—												
Lowe Inlet.....				29	59	67	58	74	76	80	135	106
Naas River.....	246	282	235	278	297	335	310	349	321	309	289	254
Skeena River.....	1,143	1,202	1,076	1,119	1,218	1,164	1,053	970	856	1,049	844	926
Rivers Inlet.....	1,149	1,449	1,144	1,461	1,603	1,899	1,699	1,802	1,490	1,796	1,550	1,518
Smiths Inlet.....	428	384	289	293	359	39	324	408	385	465	267	378
Bella Coola.....	236											
Kimsquit.....	194	359	240	238	228	285	268	265	261	242	216	192
Butedale.....	56	71	51	55	43	48	41	57	18	80	102	148
Namu.....	116	142	108	100	107	141	129	146	137	159	148	134
Queen Charlotte Islands.....	3	6	5	4	2	19		24	4	53	9	14
Total, salmon gill-net, District No. 2.....	3,571	3,895	3,148	3,577	3,916	4,377	3,882	4,095	3,548	4,233	3,560	3,670
<i>District No. 3—</i>												
Salmon cannery.....	17	17	7	8	10	7	7	8	7	6	7	8
Salmon trap-net.....	7	7	7	7	8	8	8	7	5	5	5	5
Salmon purse-seine.....	218	191	157	104	183	187	191	188	209	200	241	219
Salmon drag-seine.....	13	12	12	21	20							
Salmon-trolling.....	1,779	2,109	2,077	1,992	1,888	2,064	2,053	2,429	2,056	2,305	2,874	2,273
Salmon gill-net.....	565	643	387	336	512	646	673	741	466	573	781	485
<i>Whole Province—</i>												
Salmon cannery.....	71	54	35	44	49	49	43	46	37	38	35	38
Salmon trap-net.....	7	7	7	7	8	8	8	7	5	5	5	5
Salmon purse-seine.....	371	243	228	157	236	296	293	287	291	300	339	350
Salmon drag-seine.....	22	21	21	30	31	9	9	9	9	9	9	9
Salmon trolling.....	2,630	3,115	3,115	3,033	2,880	3,099	3,107	3,511	3,162	3,453	3,947	3,222
Salmon gill-net.....	5,609	6,061	4,893	5,359	6,112	6,826	6,218	6,620	6,096	7,125	6,502	6,392

NOTE.—Commencing with year 1930 salmon cannery licences shown above were issued by the Provincial Fisheries Department.

STATEMENT No. 13—PACK OF SOCKEYE SALMON FROM RUNS TO FRASER RIVER
1929-1940

Year	Fraser River Pack *	Canadian Traps in Juan de Fuca Straits	Puget Sound Pack	Total Cases
1929.....	60,407	3,480	111,856	175,743
1930.....	93,416	5,334	352,194	450,944
1931.....	38,507	2,440	83,728	124,675
1932.....	61,769	4,000	78,319	144,088
1933.....	43,745	8,721	125,738	178,204
1934.....	133,159	6,117	352,579	491,855
1935.....	57,212	5,610	54,677	117,499
1936.....	164,408	3,837	59,505	227,750
1937.....	66,583	6,152	60,259	132,994
1938.....	169,430	3,784	139,173	312,387
1939.....	43,249	4,290	43,511	91,050
1940.....	86,215	2,247	63,890	152,352

* For the year 1929 figures represent sockeye pack at Fraser River canneries, regardless where caught. From 1930 onwards, figures represent pack of Fraser River sockeye, regardless where canned.

DEPARTMENT OF FISHERIES

STATEMENT No. 14—STATEMENT OF FISHERY LICENCES ISSUED—BRITISH COLUMBIA—SEASON 1940-41

Variety of Licence	Issued				Transfers				Operating				Total			
	White	Ind.	Others	Jap R.S.	Can- celled	Total	White	Ind.	Jap R.S.	Total	White	Ind.		Others	Jap R.S.	Can- celled
Salmon Trap-net.....	5	9	.....	.....	.....	5	9	.....	.....	.....	5	9	.....	.....	.....	5
Salmon Drag-seine.....	297	53	.....	.....	.....	350	.....	.....	.....	.....	297	53	.....	.....	.....	350
Salmon Purse-seine.....	2,998	1,303	913	40	66	5,320	873	182	17	1,072	3,871	1,485	913	57	66	6,392
Salmon Gill-net.....	2,561	488	155	3	11	3,188	33	1	.....	34	2,594	459	155	3	11	3,222
Salmon Trolling.....	297	297	269	.....	61	724	.....	.....	.....	.....	97	297	269	.....	61	724
Asst. Salmon Gill-net.....	127	114	.....	.....	.....	241	.....	.....	.....	.....	127	114	.....	.....	.....	241
Capt. Salmon seine.....	1,206	747	.....	.....	.....	1,954	.....	.....	.....	.....	1,206	747	.....	.....	.....	1,954
Asst. Salmon seine.....	248	21	153	.....	14	436	.....	.....	.....	.....	248	21	153	.....	14	436
Cod.....	77	23	2	1	.....	103	.....	.....	.....	.....	77	23	2	1	.....	103
Crab.....	104	2	239	.....	1	406	.....	.....	.....	.....	104	2	239	.....	1	406
Grayfish.....	79	5	34	4	.....	122	.....	.....	.....	.....	79	5	34	4	.....	122
Miscellaneous.....	33	.....	10	.....	2	45	.....	.....	.....	.....	33	.....	10	.....	2	45
Small Dragger.....	37	1	18	.....	.....	56	.....	.....	.....	.....	37	1	18	.....	.....	56
Smelt.....	.....	3	2	.....	.....	5	.....	.....	.....	.....	.....	3	2	.....	.....	5
Abalone.....	27	.....	.....	.....	.....	27	.....	.....	.....	.....	27	.....	.....	.....	.....	27
Pilchard Purse-seine.....	20	2	.....	.....	.....	22	.....	.....	.....	.....	20	2	.....	.....	.....	22
Capt. Pilchard seine.....	150	10	.....	.....	.....	160	.....	.....	.....	.....	150	10	.....	.....	.....	160
Asst. Pilchard seine.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Herring Pound.....	10	.....	.....	.....	.....	10	.....	.....	.....	.....	10	.....	.....	.....	.....	10
Herring Purse-seine.....	59	2	2	.....	.....	63	.....	.....	.....	.....	59	2	2	.....	.....	63
Herring Gill-net.....	22	2	9	.....	.....	33	.....	.....	.....	.....	22	2	2	.....	.....	33
Capt. Herring seine.....	40	6	4	.....	.....	50	.....	.....	.....	.....	40	6	4	.....	.....	50
Asst. Herring seine.....	370	126	75	.....	.....	571	.....	.....	.....	.....	370	126	75	.....	.....	571
Capt. Hal. boat for bait.....	6	.....	1	.....	.....	7	.....	.....	.....	.....	6	.....	1	.....	.....	7
Capt. Tuna boat.....	1	.....	.....	.....	.....	1	.....	.....	.....	.....	1	.....	.....	.....	.....	1
Asst. on Tuna boat.....	.....	1	.....	.....	.....	1	.....	.....	.....	.....	.....	1	.....	.....	.....	1
Whaling.....	3	.....	.....	.....	.....	3	.....	.....	.....	.....	3	.....	.....	.....	.....	3
Totals.....	8,638	3,184	1,886	48	156	13,912	906	183	17	1,106	9,544	3,367	1,886	65	156	15,018

Indian permits, 2,029 (1 cancelled).

LICENCES ISSUED BY PROVINCIAL FISHERIES DEPARTMENT, SEASON 1940
BRITISH COLUMBIA

Salmon cannery	38
Herring cannery	16
Pilchard cannery	4
Shellfish cannery	6
Tierced salmon plants	4
Cold storage plants	9
Pilchard reduction	6
Herring reduction	15
Whale reduction	1
Dogfish and fish offal reduction	12
Herring dry saltery	2
Pickled herring	4
Net fishing in non-tidal waters:	
Ordinary	84
Fur farm	69
Sturgeon	2

STATEMENT No. 15—STATEMENT OF NUMBERS OF DIFFERENT SPECIES OF SALMON
AND METHOD OF CAPTURE, REPORTED BY OPERATORS OF SALMON PURSE-
SEINES, DRAG-SEINES, AND TRAP-NETS, AND BY SALMON CANNING, CURING
AND COLD STORAGE ESTABLISHMENTS, OF GILL-NET AND TROLL CAUGHT
FISH, BRITISH COLUMBIA, SEASON 1940

—	Sockeye	Springs	B. backs	Steelhead	Coho	Pink	Chum	Total
Troll.....	4,401	118,771	406,878	.....	844,948	25,055	14,310	1,414,363
Gill-net.....	3,795,255	177,274	.....	71,805	501,051	1,510,283	712,041	6,767,709
Purse-seine.....	361,889	8,309	9	1,663	215,508	2,237,807	4,294,114	7,119,299
Drag-seine.....	31,395	.....	.....	.....	8,180	21,198	6,614	67,387
Trap-net.....	28,756	21,915	.....	1,720	24,648	328	3,367	80,734
Totals.....	4,221,696	326,269	406,887	75,188	1,594,335	3,794,671	5,030,446	15,449,492

STATEMENT No. 16—STATEMENT OF NUMBER OF SALMON CAUGHT BY PURSE-
SEINES, SHOWN BY SEINING AREAS, SEASON 1940

Area	Sockeye	Spring	B. back	Steelhead	Coho	Pink	Chum	Total
1.....	275	14	.....	1	636	382,769	17,287	400,982
2.....	147	.....	.....	1	4,977	439,052	1,075,836	1,520,013
3.....	2,869	119	.....	18	2,471	202,781	65,190	273,448
4.....	889	81	.....	23	1,213	56,555	1,202	59,963
5.....	31,519	5	.....	9	17,123	101,749	36,619	187,024
6.....	24,185	508	.....	176	33,520	204,565	169,019	431,973
7.....	799	199	.....	51	7,720	144,397	275,308	428,474
8.....	231	28	.....	33	2,021	47,755	22,651	72,719
9.....	12	4	.....	.....	342	10,936	27,333	38,627
10.....	3	.....	.....	.....	479	34	50,428	50,944
11.....	.....	.....	.....	.....	1,440	698	6,951	9,089
12.....	223,515	4,420	9	1,035	78,738	543,320	1,047,162	1,898,199
13.....	47,105	1,410	.....	262	22,766	88,902	650,882	811,327
14.....	3	18	.....	18	1,337	129	48,700	50,205
15.....	.....	.....	.....	.....	6	.....	5,085	5,091
16.....	1,437	3	.....	.....	890	9,171	61,377	72,878
17.....	.....	.....	.....	.....	.....	.....	.....	.....
18.....	.....	9	.....	1	4	.....	1,961	1,975
19.....	.....	.....	.....	.....	.....	.....	.....	.....
20.....	.....	.....	.....	.....	.....	.....	.....	.....
21.....	.....	.....	.....	.....	65	.....	6,870	6,935
22.....	.....	95	.....	11	4,348	.....	274,732	279,186
23.....	2	1,396	.....	24	8,934	.....	203,460	213,816
24.....	28,898	.....	.....	.....	7,506	.....	61,699	98,103
25.....	.....	.....	.....	.....	10,764	.....	153,806	164,570
26.....	.....	.....	.....	.....	1,276	.....	5,626	6,902
27.....	.....	.....	.....	.....	6,932	4,994	24,930	36,856
Totals.....	361,889	8,309	9	1,663	215,508	2,237,807	4,294,114	7,119,299

STATEMENT No. 17—STATEMENT SHOWING PACKS OF CANNED SALMON, 1932-1940
WITH QUANTITIES GRADED SECOND QUALITY AND PERCENTAGES

—	Sockeye	Springs	Steel- head	Blue- back	Coho	Pinks	Chum	Total
1932 Pack, cases.....	284,355	76,060	1,168	28,505	160,466	223,716	306,761	1,081,031
Grade B, cases.....	3,355	1,234	164	333	119	3,083	8,238	
Per cent.....	1.179	1.622	.575	.207	.053	1.005	.766	
1933 Pack, cases.....	258,107	20,266	1,459	21,763	137,289	532,558	293,630	1,265,072
Grade B, cases.....	494		10	873	15,149	887	17,413	
Per cent.....	.191		.045	.635	2.844	.302	1.376	
1934 Pack, cases.....	377,882	29,784	1,282	29,556	195,874	435,364	513,184	1,582,926
Grade B, cases.....	21,620	139	5	962	4,085	1,127	27,938	
Per cent.....	5.721	.466	.390	.491	.938	.219	1.764	
1935 Pack cases.....	350,444	21,920	596	15,319	216,173	514,966	409,604	1,529,022
Grade B, cases.....	3,435	659		3,840	20,528	5,601	34,063	
Per cent.....	.980	3.006		1.776	3.986	1.367	2.227	
1936 Pack, cases.....	415,024	29,854	1,068	33,718	212,343	591,532	597,487	1,881,026
Grade B, cases.....	13,725			483	29	5,265	19,502	
Per cent.....	3.307			.227	.005	.881	1.036	
1937 Pack, cases.....	325,774	16,171	844	19,236	113,972	585,576	447,602	1,509,175
Grade B, cases.....	65			68	27,282	3,212	30,627	
Per cent.....	.019			.059	4.659	.717	2.029	
1938 Pack, cases.....	447,453	15,531	1,035	27,417	273,906	400,876	541,812	1,707,830
Grade B, cases.....	16,361			56½	1,111	1,413	1,583	20,524½
Per cent.....	3.656			.206	.405	.352	.292	1.201
1939 Pack, cases.....	269,888	16,097	797	48,209	196,887	620,595	386,584	1,539,057
Grade B, cases.....	3,444½	11	20	17	142½	45,667	1,068	50.370
Per cent.....	1.276	.068	2.509	.035	.072	7.358	.276	3.272
1940 Pack, cases.....	366,403	17,741	1,205	23,277	201,467	213,911	643,443	1,467,227
Grade B, cases.....	1,778½	57		13	461	2,530	3,298½	8,138
Per cent.....	.485	.321		.054	.228	1.182	.512	.554

SPAWNING REPORT, 1940

An endeavour is made each year to have each salmon stream inspected, although, in view of the fact that there are in the vicinity of 800 such streams the task of a thorough inspection in each case is often beyond the capabilities of the staff available.

There are some areas where the conditions of the country are such as to preclude regular inspections of the spawning areas. The upper portion of the Naas River system, for instance, cannot receive the attention desired. This also applies to a section of the Skeena River watershed. Conditions of travel, from the standpoint of hazard to life, time consumed, and expense make these inspections prohibitive.

Inspections are made with a view to ascertaining information under the following headings:—

(1) *Intensity of Seeding*.—It is necessary to know each year just how the seeding of each variety of salmon compares with that of other years, particularly the brood year. With this information in hand it is usually possible to take any necessary measures in the later cycle years to correct depletion.

(2) *Obstructions to the Ascent of Salmon*.—These include natural falls and rapids in the several streams, power dams, or log jams formed as a result of freshets or logging operations.

(3) *Pollutions*.—Under this heading come the effluents of pulp mills, the discharge of sawdust from saw-mills, and the effluents from mining operations.

(4) *Enemies of Salmon*.—These consist of bears, wolves, trout, gulls, ducks, eagles and other bird life which prey on the spawning salmon.

(5) *Freshets*.—In numerous parts of the province, particularly the mountainous portions, heavy rains during the fall cause the streams and lakes to rise very rapidly, resulting in a great outrush of water which often destroys the spawn which may have been deposited by the salmon.

SOCKEYE

Generally speaking, the supplies of sockeye found on the spawning grounds this year were entirely satisfactory, notwithstanding the poor catches in certain areas. The case of Rivers Inlet is interesting in this connection as the commercial catch was small, but the condition on the spawning grounds showed that without doubt an unusual proportion of the run passed safely beyond the commercial fishing areas. In the Naas, Skeena, Bella Coola, and Rivers Inlet areas, there is every reason to believe that the sockeye runs were early and well under way by the time fishing was opened on July 1.

In the Chilco watershed of the Fraser River system an unusually large supply of spawning sockeye was observed. In the Barclay Sound and Nitinat areas, however, the spawning was poor.

SPRINGS

The supplies of spring salmon on the spawning grounds were not as good as could be wished, although in certain areas conditions were quite good.

COHOES

Coho spawning, generally speaking, was unsatisfactory along the whole coast. Off the west coast of Vancouver Island appeared the largest run of cohoes that could be remembered in recent years, and the trollers obtained splendid catches well off shore.

PINKS

The greatest disappointment was in pink supplies, the pack being less than 50 per cent of what might reasonably have been expected. The conditions on the spawning grounds in the brood year, 1938, were excellent in many areas but the return this year, for some unknown reason, was largely a failure. Particular mention is made of the Bella Coola area, where, in 1938, such an excellent spawning occurred. There were no serious freshets in that year and spawning conditions generally were good. Notwithstanding that, the return this year was negligible. This was the "off" year for pinks, of course, for the Fraser River district.

CHUMS

Notwithstanding the unusually intensive fishing for chums, the spawning grounds, generally speaking, were well supplied.

More detailed descriptions of conditions found are as follows:—

Queen Charlotte Islands.—All varieties of salmon, with the exception of sockeye, frequent this area in commercial quantities. A few sockeye reach Massett Inlet and Copper River each season but the quantity is not sufficiently large to justify commercial operations.

The pink seeding in the Massett area is reported as being generally satisfactory, particularly in the Yakoun River which is the largest stream in the area. It is suggested by the local officer that this year's seeding is heavier than any since 1930. Most of the supply on the spawning grounds appears to have been from the late run as the earlier run was very intensively fished. In Juskatla Inlet, although there was no fishing, the supply on the spawning grounds was found to be unsatisfactory. The supply on the Naden Harbour

spawning grounds was light. The seeding of the beds in the balance of the Queen Charlotte district was poor. The coho supply is reported poor in comparison with the spawning of other years. Springs frequent the Yakoun River only and the runs showed a slight improvement. The chum supply in the Naden Harbour district was exceptionally good. That in the Massett Inlet area, however, is reported as a failure. The creeks in the balance of the Queen Charlotte Islands, apart from the west coast, were satisfactorily seeded.

Naas Area.—The early run of sockeye to the Meziaden Lake district, the principal spawning ground, was only medium, and the later run is reported as light. The escapement past the commercial fishing area was reported as good and certainly much better than would appear from the report of the Meziaden district. There are considerable portions of the Naas River district, however, to which sockeye are known to proceed but which have not been inspected in recent years because of travel difficulties. It is very probable that these areas were well supplied, particularly as the run, in common with that to some other areas, was early and was practically at its height when fishing opened on July 1. The inspecting officers commented on the large size of the individual fish in this year's run.

The supply of springs in the Meziaden area was reported as only medium, although the escapement past the upper river fishing boundary was a good average one. The coho run in the Meziaden area had only commenced at the time of inspection but the escapement past the commercial boundaries is reported as having been very good. The seeding generally by this variety might be termed medium. The pink spawning at Khutzymateen Creek is reported as being very good. This also applies to Ikgiik and Kincolith Creeks, and Quinnimas and Teon Rivers. The seeding in other creeks was light. The chum seeding is also reported as light. This has never been a prolific chum area. The Maziaden fishway is reported as being in good condition and functioning satisfactorily.

Skeena Area.—The inspector for the Babine district, the main spawning area, reports that taken as a whole the sockeye run was a very heavy one, and better than that of 1936. The highlights were the heavy runs on the Babine and Fulton Rivers, as well as at Morrison Creek and several other smaller streams. Apparently the spawning beds at the Babine and Fulton Rivers received the heaviest seeding for some years and the whole situation, in so far as sockeye are concerned, is eminently satisfactory in the Babine area.

There was no doubt some loss of eggs in several of the more important streams, due to the large quantities of spawning females which, as the later runs arrived, dug up the eggs of those which had arrived previously. In addition, due to high water conditions, some further loss is expected as eggs were deposited in portions of the creeks which went dry as soon as the water dropped to normal condition. Notwithstanding these losses, however, there has evidently been an excellent seeding.

Sockeye supplies on the spawning grounds of the Lakelse Lake system, tributary to the Skeena River, were also abundant, showing improvement over the cycle years of 1935 and 1936. There was a heavy run of sockeye to the Morice Lake district. In the Oestahl section a good supply of sockeye was observed, an improvement over the cycle years of 1935 and 1936. The seeding of springs was found to be not more than medium. In the Oestahl section the supply was adequate, however, and the seeding of the Morice Lake area is reported as heavy. The coho run was light, as it was also in the Oestahl and Morice Lake systems.

The year under review was an "off" one for pinks in the Babine section of the system but the quantity observed was stated by the inspecting officer to be medium, under the conditions. In the Lakelse Lake section, however, the pinks were found to be abundant and the seeding better than in the brood year of 1938.

In the Oestahl system, although the quantity of pinks was found to be only medium, yet it was an improvement over the brood year of 1938. The chum supply in the Oestahl system was found to be disappointing, although the Skeena system has never been an important one for this variety.

It is interesting to remember that this season is the first which could be expected to show the effects of the moving of the fishing boundary on the Skeena River seven miles down towards salt water. This conservation measure has undoubtedly been fully justified by results found on the spawning beds.

Lowe Inlet Area.—The sockeye supply to most of the streams in this area, is reported as lighter than usual. Escapement, however, was larger, in proportion to the catch. This was due to high water conditions. The coho supply was found to be fairly good, particularly in the streams on the west coast of Banks Island, although many streams in the area were poorly seeded. The pink spawning in this area was disappointing, particularly in the streams in the southern part of the area, in the vicinity of Gil Island. The streams in the North Grenville and Ogden Channel areas were much better than usual, although not as good as in 1938. Unless flood conditions in 1938 are the cause, there is no apparent reason why this year's run of pinks should not have been better. The chum supply is reported as being fairly good, although the streams in the Kitkatla Inlet portion of the area will require some further protective measures. This area is not a heavy producer of this variety.

Butedale Area.—The weather in this area was reported as the wettest season on record. This would, of course, cause flooding in the salmon spawning streams, and possibly some damage to the eggs. It also made the examination of the spawning areas difficult.

The sockeye spawning was found to be normal and compared favourably with that in the brood year, 1936. The escapement to Qua Qua Inlet spawning grounds was particularly heavy. The spring supply was slightly better but the run of this variety is not of much importance in the area. On the other hand, the coho spawning is reported as being very satisfactory. In the case of the pinks, for some unknown reason, the supply was the smallest on record for an "even" year. This was particularly noticeable in the northern part of the area, the southern showing being considerably better. Some streams received quite heavy supplies. The chum seeding was found to be poor, with the exception of a few streams.

Bella Bella Area.—The escapement of sockeye, coho, and pink salmon to this area was light during the season under review, notwithstanding the unusual curtailment of fishing time. Out of forty-three salmon streams inspected the only exceptions were Tinkey River where a heavy escapement of sockeye was found, Gull Chuck and Howyet Rivers, with a heavy escapement of coho; and Koeve River with a medium escapement of pinks. The chum supply was also found to be light, although after the fishing season closed there was a further run which proceeded unmolested to the spawning grounds.

It will be remembered that although 1938 was what is known as an "off" year for pink salmon in this area, the escapement was quite heavy and the spawning beds in all streams of importance were reported as being well seeded with spawning pinks. In view of this fact it is difficult to understand the 1940 shortage.

Bella Coola Area.—The sockeye spawning here is reported as being very satisfactory, showing a substantial increase over that of the brood year. This probably is due largely to the fact that the run was early and that by the time fishing opened the run was at the height, permitting a large escapement, unmolested by fishing operations. An unusually abundant supply of spring salmon was also found. The coho seeding was normal, with the usual run passing safely upstream after the fishing was over. In the case of the pinks, the spawning

was found to be most disappointing, notwithstanding that fishing operations were not intensive. This condition is not understood, in view of the good spawning conditions in the brood year of 1938. In the case of Quatna River, for instance, specifically mentioned by the inspecting officer, notwithstanding excellent spawning facilities and an abundant seeding in 1938, with no freshet damage, and very little fishing in the vicinity this year, the run was a failure. The chum supply was found to be very fair although not up to expectations. Most of the smaller streams were well supplied.

Up to November 1 no appreciable flood damage had been observed in the area.

Rivers Inlet Area.—Notwithstanding a most disappointing commercial catch of sockeye, conditions on the spawning grounds were found to be excellent. Possibly the seeding was not as good as took place under the splendid conditions obtaining in 1935 and 1936 but it was decidedly satisfactory. Particularly good supplies were found at Waukwash, Shumahault, Quap, and Whonnock Rivers. Speaking of the Quap, the inspecting officer states,—“The river was loaded from stem to stern.” The run appeared to have been at its peak when fishing opened on June 29.

There was a very heavy flood between October 17 and 20, resulting in the lake rising to such a height that there were four feet of water on the floor of the old hatchery building. Nevertheless, due to the early date and the low water conditions in the lake, before the freshet, it is estimated that the detrimental effect on the spawning was of a minor degree.

A great proportion of the spawning salmon was found to be very large individually; in fact, the inspecting officer reports that he is satisfied the average size of mesh used in sockeye fishing in Rivers Inlet during the season could not have gilled these large specimens. Many were found showing net marks, indicating that their progress towards the spawning grounds had been interrupted temporarily.

The serious floods in 1936 obviously affected the four-year cycle.

It was found that the Waukwash River, which, some years ago had changed its course near the mouth with the possibility of some detrimental effect on spawning conditions in future years, had returned to its original channel and is now as good a spawning stream as ever.

The supplies of fish on the spawning grounds of the several streams entering directly into Rivers Inlet were found to be only fairly satisfactory. This refers to cohoes, pinks and chums.

Smiths Inlet Area.—The remarks regarding Rivers Inlet apply largely to this area also, for, notwithstanding the disappointing commercial catch, the escapement and spawning of sockeye were good. In the Geluck River sockeye were reported as being present on every bar in good numbers. The fish here also were found to be large in size individually. The Delabah River, the other important sockeye stream, was well seeded.

The coho seeding in the area was poor but the pink seeding in Nekite River was good. A heavy escapement of chums to the Takush River was found. This is the principal chum spawning area in the district.

FRASER RIVER WATERSHED

Prince George Area.—Whilst the quantity of sockeye observed on the spawning grounds was again found to be few compared with the quantities of years ago, this season's spawning showed an improvement over that of the brood year. The fish were in good physical condition on arrival, although many were reported as being 3-year olds. The inspecting officer mentions a large increase in the number of spring salmon this year in the main spawning beds of the Stuart and Nechaco Rivers.

Quesnel Area.—A satisfactory increase in sockeye spawners over the numbers observed in the brood year is reported in both the Bowron River and Chilco Lake systems. The increase at these points is estimated at 300 per

cent. The outstanding feature of the 1940 sockeye spawning conditions on the Fraser system is the abundant supply observed in the Chilco Lake area. In the brood year of 1936 it was estimated that 74,000 sockeye spawned in the system but in 1940 the total was close to 350,000. Conditions in those parts of the rivers leading to the spawning beds were apparently good as the spawning fish arrived in excellent condition.

The spring salmon supply was normal in the area.

Kamloops Area.—At Raft River the seeding of sockeye was excellent. It is possible, however, that some damage may have been done by the freshet which occurred after the eggs had been deposited. At Adams River and Little River the spawning was heavier than in the brood year of 1936. The seeding of springs was estimated to be normal, but the coho supply was not up to expectations.

Pemberton Area.—It is estimated that 20,000 sockeye reached the spawning grounds in the Birkenhead River. This was a decrease of approximately 50 per cent from that of the brood year.

Sockeye returned to the Anderson-Seton Lake system again, although not in as large numbers as in the brood year. The supply of springs was normal. This also applies to the coho species. The run of chums to the Squamish River showed in smaller numbers than in recent seasons, yet it is expected that the seeding will be adequate. Freshet conditions may, however, have resulted in some loss of eggs.

Hope Area.—A normal seeding of sockeye was observed in Coquihalla River and Spuzzum Creek. Cohoes and chums were found in fair numbers. Steelhead were numerous.

Conditions at Hell's Gate were reasonably good and although as usual salmon were delayed from time to time for short periods, there appears no reason to believe that they did not all succeed in passing beyond this point.

Chilliwack Area.—The main sockeye portion of this area is the Cultus Lake system where approximately 74,000 spawning fish were counted over the fence operated by the International Pacific Salmon Fisheries Commission. This run was the result of the hatchery operations in 1936, when all sockeye were spawned by the hatchery staff, none being permitted to spawn naturally. The supply of springs was normal and of cohoes fair; this also applies to the chums. The steelhead trout seeding was very good.

Harrison Lake Area.—A good spawning of sockeye was observed in Silver Creek and Morris Creek and at the rapids in Harrison River. These supplies show an improvement over those of recent years. The spring, coho, and chum seeding cannot be considered as satisfactory.

Pitt Lake Area.—The seeding of sockeye showed an improvement over that of the brood year and spawning conditions were favourable. Normal supplies of springs, cohoes and chums were observed.

Lower Fraser Area.—In the several streams such as the Alouette, Coquitlam, Bear and Salmon Rivers, emptying into the lower portion of the Fraser, the coho supply was found to be disappointing. The chum seeding was also not up to expectations.

North Vancouver Area.—The coho spawning was fair, and although the number of chums appearing was not as great as expected, the seeding was reasonably satisfactory.

A great improvement was observed in the chum supply at Nelson Creek, where, last year a large boulder which had obstructed the passage of the fish, had been removed. The seeding of steelhead was not up to expectations.

Alert Bay Area.—The sockeye spawning beds were heavily seeded in the Nimpkish River, which is the most important stream in the district. Conditions

here were quite equal to the satisfactory ones of the brood year of 1936. The run to Fulmore River, Port Neville, did not compare with the unusually heavy run of 1936. In the other sockeye streams, such as Keogh, McKenzie, and Kahweiken Rivers, the supplies were normal, but light at Nahwitti and Shushartie Rivers. At Kleena-Kleene River, head of Knight Inlet, the largest quantity yet observed was found, although this is not a particularly important sockeye stream. Sockeye spawning conditions, generally, over the district were satisfactory.

The supply of springs was somewhat better than that of the brood year, except at Adams River where a decrease was found.

A heavy supply of pinks was observed at Kingcome, Adams, Glendale, and Quatse Rivers, and Embley Lagoon. A slight increase over the brood year was also found at Bond Sound, Thompson Sound, and Wakna Cove. The supplies at Shushartie River, Cache Creek, Klucksivi, Hoeye and Wakeman Rivers, were again light.

The spawning of cohoes was satisfactory at practically all streams on the mainland portion of the district, except at Wakeman and Kingcome Rivers. The spawning in the first mentioned streams was estimated at 50 per cent better than in that of the year 1937. In the streams on the Vancouver Island side an increase of at least 25 per cent over the spawning of 1937 was observed.

Chums were found to be plentiful on the spawning grounds with heavy supplies at Nimpkish, Fulmore, Bond and Glendale Rivers, and in practically all streams in Seymour Inlet. Medium supplies are reported at most other streams, with good spawning conditions.

As the fishing operations were concentrated largely in the Broughton and Johnstone Straits portions of the Alert Bay area, distant from the spawning streams, the escapement to the numerous streams was very good.

Quathiaski Area.—An excellent supply of spawning sockeye was found on the Haydenbay spawning beds and a very good one at Phillips Arm. The improvement in both areas over that of the brood year was very considerable. A normal supply of springs was observed.

The coho supply was rather light. Pinks were definitely scarce, particularly in view of the fact that 1940 appeared to have been a good year. The exceptions were Bear River and the stream entering into Grassie Bay. A very heavy seeding of chums is reported in all streams.

Comox Area.—The seeding of springs is reported as much lighter than that of an average year. The coho seeding is reported as being only medium, but definitely better than that of 1937. This system does not appear to have yet fully recovered from the severe freshets of 1934. At Oyster and Puntledge Rivers and all streams flowing into Bayne Sound the supply was light. At Tsolum, Big and Little Qualicum, and Englishman's Rivers the coho supplies were found to be good. The chum seeding is described as light, save at Englishman's River and French Creek where the supplies were found to be satisfactory, and at Little Qualicum with a reported heavy seeding and Big Qualicum with an exceptionally heavy seeding. Apparently the steelhead runs in this subdistrict are being well maintained.

Pender Harbour Area.—Whilst this is not a prolific sockeye area, an unusually abundant seeding was found in the Saginaw Lake system. The coho supply, generally speaking, was normal, with a slight increase in Sliammon River. The supply of springs was light. The year under review was an "off" one for pinks in this area. An excellent supply of chums was observed throughout the district, especially in the Sliammon River system.

Nanaimo Area.—In the various small streams lying between Englishman's River and Nanaimo the return of parent cohoes was about the same as during the brood year. This was true also of chums and steelheads.

Ladysmith Area.—The seeding of springs was found to be normal and that of cohoes quite satisfactory. This is not a pink area. The chum seeding was found to be adequate.

Cowichan Area.—The seeding of springs is reported as being an improvement over that of 1939 and fully equal to that of a good average year. This is particularly satisfactory in view of the mortality amongst springs in the Cowichan Bay area, due to conditions which were the subject of an investigation by the officers of the Fisheries Research Board.

The supply of cohoes was found to be normal and while the chum seeding was not as heavy as that of the preceding season it is considered satisfactory. The steelhead seeding is reported as being very good; the inspecting officer states that it is evident the annual runs of this variety are not only being well maintained but are increasing noticeably.

Victoria Area.—Coho and chums are the only salmon frequenting this subdistrict in commercial quantities. The seeding of the former was somewhat lighter than in the average year, but supplies of the latter were found to be satisfactory. Steelhead seeding was normal.

Alberni Area.—Watersheds frequented by sockeye salmon are those of the Somass, Anderson and Hobarton Rivers. The supplies in the first-mentioned area are reported as being very disappointing compared with the brood year of 1936. This is not understood in view of the good seeding four years ago. The same remarks apply to Anderson River and lake where the seeding was found to be very poor. Very similar conditions obtained at Hobarton River. The seeding of springs is reported as being very satisfactory, except in the Nitinat. Coho seeding is reported as being exceptionally good this year in the streams generally frequented by this variety, such as the Somass, Nahmint, Toquart, Sarita, San Juan and Nitinat. The chum supply was very disappointing, notwithstanding the heavy seeding of four years ago.

Clayoquot Area.—The sockeye seeding in the Clayoquot River portion of the Kennedy Lake area is reported as being very satisfactory, corresponding with that of the exceptionally heavy run of the brood year of 1936. In the Elk River, a tributary, the supplies were not as large, but adequate. The Medgin River spawning was normal. The seeding of springs is reported as good; the inspecting officer reports that they have been on the increase during the last two years. The coho seeding was very good. The chum seeding is reported as being satisfactory, far ahead of that of last year, and compared well with the seeding of the brood year.

Nootka Area.—The spring supply was only fair. Although the coho seeding is usually small in this area, the 1940 supply was satisfactory. The chum run is the most important in this area but in the season under review the seeding was found to be disappointing, particularly disappointing in view of the excellent seeding of 1936. Special conservation measures permitted a good percentage of the run to pass to the spawning grounds.

Kyuquot Area.—The sockeye run to this area is not of commercial importance. Seedings both of springs and cohoes were found of a fair average. The chum seeding was disappointing as in the brood year the seeding was good.

Quatsino Area.—The small sockeye run to this area is of little commercial value. In the Marble Creek watershed, to which 75 per cent of the springs in this area run, the seeding was found to be above average. The pink supply was not as good as usual, except at Rupert Creek where it was reported as very heavy, and in East Creek and Klashikish River where the seeding is also reported as heavy. The chum run was below normal but the escapement, due to special conservation measures, was of average size.

APPENDIX No. 3

ENGINEERING BRANCH

REPORT BY CHARLES BRUCE, M.E.I.C., CHIEF ENGINEER

The Engineering Branch is responsible for all works of a technical nature undertaken by the department in the Maritime Provinces, British Columbia and the Northwest Territories, where the fisheries are administered by the federal government. These include the removal of obstructions in rivers which impede or prevent the ascent of fish to spawning grounds, the design of fishways prescribed, under the provisions of the Fisheries Act, for privately owned dams, the design and construction of fishways to overcome natural obstructions, surveys and construction in connection with all fish cultural establishments, and the design and supervision of bait freezers and cold storage plants in instances where subsidies toward their cost is paid by the federal government. The branch is also responsible for the administration of the department's oyster cultural work in the Maritime Provinces. Work in British Columbia is under the direct supervision of John McHugh, resident engineer, with headquarters at Vancouver, B.C.

BUILDING FISHWAYS AND CLEARING RIVERS

Works under this head involve,—(a) surveys and the preparation of designs for adequate fishway facilities either in dams which prevent the free passage of fish to spawning grounds or to overcome natural falls or impassable barriers to their ascent (b) the removal of obstructions which have accumulated as a result of land slides, accumulations of forest rubbish or large trees which have fallen across streams as a result of freshets undermining the banks and in some instances materials either placed or carried into the streams as a result of logging operations. Through the activity of the local inspectors and fishery guardians logging operators are, in general, giving greater care to the disposal of their slash and waste when it is likely to menace areas drained by streams frequented by fish, as they have been brought to realize that it is less expensive to arrange from the commencement of operations to keep streams clear of fallen material and culled logs than to be required to return afterwards and clean up the debris. In spite of this, however, jams composed of materials washed down from the river banks during freshets and other debris will continue to form in stream beds, but, if their removal is undertaken without undue delay, heavy expenditure in individual cases may be avoided.

Discontinuance of artificial fish cultural work for the propagation of salmon in Pacific Coast waters has resulted in attention being focussed more than ever on the preservation, improvement and development of natural spawning grounds which lie in the great numbers of streams draining the British Columbia coast-line and are in many instances difficult of access. Before any improvement of conditions for the ascent of fish past natural barriers is undertaken, with the view to an extension of spawning areas, it is necessary to explore the stream above the barriers to determine whether suitable gravel beds exist of sufficient extent to give promise that the returns will be commensurate with contemplated improvements.

Unless obstructions are of a major character, such as to require the advice of an engineer, it is the usual practice to require their removal under the supervision of the local fisheries inspector, after the need has been established.

The works undertaken during the year are classified and reviewed hereunder.

NOVA SCOTIA

Tusket River, Yarmouth County.—The fishway for the Reynardton dam on this river, the design for which was furnished to the Nova Scotia Power Commission during the previous year, was completed by the commission. An inspection indicated that, while fish had ascended, it might be necessary to require a barrier or screen to more readily direct them to the entrance. The fishways on this river at the power development were also inspected.

Roseway River, Shelburne County.—The fishway in the dam at Lower Ohio was inspected and information procured for certain small repairs.

Broad River, Queens County.—A survey was made to procure information for the design of a fishway in the dam on this river owned by the Intercontinental Lumber Company.

Medway River, Queens County.—A survey was made at a new location for a fishway in the dam at South Brookfield and the design was subsequently prepared. There has been a difference of opinion both as to the need for a fishway at this point and the best location for it. Designs have now been made for three locations, but no decision to proceed has yet been reached.

An inspection was made of a situation below the Charleston dam where ice had carried away a cribwork designed to facilitate the ascent of salmon. It was decided that construction might be deferred for the present and that the guardians could make temporary provision by placing rock in the stream bed.

Gaspereau River, Kings County.—During the year the Nova Scotia Light and Power Company, Limited, which operates hydro-electric plants on this river, decided to increase the storage facilities in Gaspereau Lake by adding three feet to the height of the dam. This resulted in a complete change in the conditions for the ascent of fish into the lake and made it necessary to re-design the fishway facilities to meet these changes. An instrumental survey was made and plans for a fishway prepared and furnished to the company.

The company completed the installation of a screen in the diversion canal from Gaspereau Lake during the summer but, as was feared, while this screen prevented the seaward migrating fish from passing down the canal to the power development, they would not leave the canal through a by-pass which the company hoped would provide a means for their descent to the main river. It was accordingly necessary to investigate the feasibility of locating a by-pass with the flow into it directly above and at one end of the screen fixture. Surveys indicated that this would be possible and the matter was taken up with the company with the view to having work undertaken during the season of 1941.

East River, Sheet Harbour, Halifax County.—While, as stated in a previous report, unfavourable conditions for salmon in this river, due to almost complete water control, make it doubtful if much can be accomplished towards maintaining satisfactory runs, it was deemed desirable to procure further information regarding the possibility of improving the fishway facilities in the hydro-electric dam at Ruth Falls. A detailed survey leads to the belief that the present facilities at the westerly end of the dam can be improved at a much lower cost than would be involved in providing a new fishway at the easterly end of the dam.

MacKenzie Brook, Inverness County.—A small obstruction consisting of drift and debris, which it was considered would, if not disbursed, develop into a larger obstruction to the ascent of fish, was removed.

Fyfes Brook, Inverness County.—Obstructions consisting of old logs and river drift which completely barred the ascent of fish at several points were removed.

North River, Victoria County.—This river which is frequented by salmon in good numbers has several falls on it. Some improvement work has been done to facilitate their ascent. Early in the year, a boulder over twelve feet in diameter became dislodged from the canyon wall and fell into the pool directly below one of these falls in a position which completely barred the ascent of salmon and it was necessary to remove it by submerged blasting. This particular falls is perhaps the most difficult on the river for salmon to ascend and, while some blasting resulted in an improvement, salmon are unable to make the ascent except during certain favourable water conditions. Further inspection is planned when a study of the possibilities for improving the falls will be made and, if this is not feasible, the construction of a fishway will be considered.

NEW BRUNSWICK

Newcastle Creek, Queens County.—Following the completion of a survey, plans for a fishway for the Miller dam on this river were prepared and furnished to the New Brunswick Fish and Game Protective Association. The association had requested the plans and indicated that they were prepared to proceed with the installation of the fishway.

Mactaquac River, York County.—A survey to afford information for the design of a fishway for a small dam which the owner was rebuilding was completed. Later inquiry as to the value of this stream for spawning purposes led to the conclusion that the expenditure for a fishway would not be warranted.

Quisibis River, Madawaska County.—Information for the design of a fishway for a dam which the Fraser Company, Limited, had completed ten miles from the mouth of this river was procured. As the river flows into the St. John River above Grand Falls and consequently is not resorted to by salmon, it was decided that a fishway would not be required at the present time.

BRITISH COLUMBIA

Atnarko River.—There is an annual deposit of river drift in the sluggish section of this stream, the main feeder of the Bella Coola River, which, if not opened up, would shut off the only sockeye spawning grounds of the system. The clearance of this deposit was effected during the early months of the spring by the local inspector with the assistance of local labour and, as a result, sockeye salmon reached their spawning grounds without delay.

Big Qualicum River.—This is another stream which requires attention from year to year. It flows through areas once covered with a heavy growth of coast fir extensively logged in recent years. Two extensive jams in the lower reaches almost filled the entire bed of the stream and, the immediate banks at each of these points being low, the action of the stream at freshet time, when the run-off cannot pass through the regular channel, is to scour out new channels which become littered with debris of large fir stumps and drift material as a result of this erosion. There will be necessity for a small annual appropriation for work on this stream for years to come. Passage of salmon through log jams is not impeded, provided small channels through them are maintained. This procedure was followed this year through two quite extensive jams and salmon passed safely upstream.

Breaker Bay Creek, Louise Inlet, Q.C.I.—An obstruction on this stream consisting of debris left from logging operations was removed by local patrol crews without any additional cost for labour. Such work, where it can be done without any outside assistance, is now included in the duties of inspectors, guardians and patrol men and they are doing valuable work in preventing what might become major expensive jobs by taking action in initial stages.

Coal Creek, Vancouver Island.—Debris from old logging operations make it necessary to give annual attention to this stream which is frequented by pink, coho and chum salmon in substantial numbers. Passageways were opened up through two separate jams during the season, enabling the fall run to pass upstream. Much debris remains in the stream bed, however, and additional work will be required from time to time.

Dutch Harbour Creek, Barclay Sound.—Obstructions of logging debris were removed from this stream by local patrol boat crews without any cost except a small sum for explosives.

French Creek, Vancouver Island.—A passageway was cut and cleared around one end of a log jam between 50 and 60 feet in length, thereby providing access to four miles of spawning grounds.

Kwakusdis River, Yeo Island, Bella Bella Area.—High winds, developed in a local storm, felled a number of trees into this stream, carrying with them a large rock which fell into the stream bed at its narrowest part, trapping a school of sockeye and preventing a large school of coho in the bay from ascending to spawning grounds in Kwakusdis Lake. Quick action was necessary and the obstruction both of trees and rocks were removed in time to permit the salmon to reach their spawning grounds.

Little Qualicum River, Vancouver Island.—An inspection of the log jams on this stream, which have been attended to in recent years, revealed that the passage through them still remained open and unobstructed and that further work was not required.

Mahatta River, Quatsino, Vancouver Island.—A survey of the canyon section of this stream with a view to improving conditions was made. Various protruding rocks in the streambed caused turbulence and broken water, making conditions difficult at times for ascending salmon. Two alternate schemes were proposed, one of which was recommended. It is hoped that the work can be completed during the 1941 season. The stream carries a valuable run of both sockeye and coho salmon and their ascent to spawning grounds in the lake is, under certain conditions of high water, attended with difficulty.

McCoy Creek, Barclay Sound Area.—Small obstructions of logs and forest refuse were removed by local officers. No expenditure except that for a small quantity of explosive was required.

Nelson Creek, Burrard Inlet.—A large boulder, washed into this streambed as a result of local floods, caused a complete obstruction to the ascent of parent salmon to spawning grounds above. Being in a ravine section of the creek, it was impossible to excavate suitable channels around either side, and the boulder itself was eventually removed, permitting uninterrupted passage of chum salmon frequenting this stream.

Popcum Creek.—Examination of a small dam on this stream used by a local resident to furnish a domestic water supply revealed that certain structural alterations were required in order that salmon should not be hindered in their ascent. These alterations were made and ascending coho salmon encountered no difficulty in surmounting the obstacles.

Qualatti River, Knight Inlet.—During the winter of 1931-32 a fish pass was excavated through the falls located near the mouth of this stream. These falls appeared to be created by huge fragments of rock, fallen from the sheer cliffs alongside, resting on the ledge rock of the river bed, making a broken fall nine feet high over a river channel 80 feet wide. The pass in question was

excavated on the east bank of the river by blasting individual rock masses and confining a portion of the current to this channel by means of low concrete walls. In 1939, the local inspector reported the existence of a rock slide which was getting worse each year. Examination revealed that the pass had become practically obliterated by falling and moving rock and conditions for ascending salmon are again difficult. Future consideration at this point will require to be concentrated in the construction of a pool and fall fishladder with concrete partition walls away from the banks and nearer the centre of the falls where it is felt the work can be done on the solid ledge.

Rosewall Creek, Vancouver Island.—Fairly large expenditures have been made on this stream since the year 1918. Probably no other stream on Vancouver Island has suffered so much from the effects of logging operations. Banks of the stream in the upper reaches for three or four miles are strewn with the wreckage from logging operations and each freshet carries a portion of this material towards the mouth, diverting and dividing the stream into separate channels. The original streambed is in many places filled more than bank high with gravel so that during the summer and early fall months no water is visible in the lower mile of the streambed until it trickles through the gravel beds near the mouth. The problem of log jams on this stream will be annually recurring for many years to come, certainly until the upper section of the watershed have become reforested. There appears to be no other way to deal with the log jams as they form and become impassable than to keep small channels opened up at minimum expense. Such method was adopted this year in dealing with a particularly bad jam located about one-quarter of a mile upstream from the mouth. A narrow channel was cut around the jam on one bank, providing a suitable passageway for the ascent of fish.

Silesia Creek, Tributary to Chilliwack River.—A log jam on this stream measuring 100 feet long, 25 feet wide and 20 feet high in places was examined. The jam is securely locked within narrowing canyon walls and it was considered quite impossible that it would be removed by natural agencies. Owing to the difficulty of access and transportation, mostly pack trail, it was considered that the jam could be removed most economically by contract. Specifications were prepared and tenders called for, but, while the only bid received was considered reasonable, sufficient funds were not available to admit of awarding a contract. This jam is positively a barrier and should be removed if the salmon population of this stream is to be preserved.

Sproat Falls, Vancouver Island.—Accumulations of logging debris which interfered with the free passage of salmon were removed from this falls by local officers without any expense except for explosives. The seasonal run of salmon passed upstream without hindrance.

Two Mile Creek, Quatsino Area, Vancouver Island.—A log jam consisting of an accumulation of big spruce, hemlock and cedar logs badly interlaced and backed up with gravel, evidently the result of a land slide in the upper reaches of the stream, proved a barrier to the ascent of chum salmon. An opening eight feet wide was cut clear through the centre of the jam and the excavated material floated out to sea. As a result, a medium run of chum salmon passed beyond the point of obstruction and reached all of the spawning grounds available above.

Whiskey Creek, Tributary to Little Qualicum River, Vancouver Island.—A log jam consisting of logging refuse washed into the stream-bed subsequent to erosion, was removed. The jam was not large, but was a complete barrier to the ascent of coho and chum salmon which moved upstream without hindrance on completion of the work.

Stamp Falls Fishladder, Vancouver Island.—This fishladder functioned well during the year, large numbers of salmon passing through it to spawning grounds in the upper reaches. Being of solid rock and concrete construction, the ladder required little maintenance. Its only defect at the present time consists of undermining of the lower wall as a result of the movement of boulders in the pool above. These boulders, which are washed in by the current or fall in from the side slopes, are churned round by water action until finally there is a break through. It is planned to make the necessary repairs during the coming year.

Skutz Falls Fishladder, Cowichan River, Vancouver Island.—Similar trouble to that indicated above had occurred in connection with three cross walls of this fishladder. During the summer months the ladder was de-watered and complete repairs made, the undermined portion of the walls being rebuilt with masonry in cement mortar.

Louis Creek Fishladder, Kamloops District.—The fishladder on this stream, owned by the Canadian National Railways was redesigned and rebuilt during the year. Coho salmon which frequent this stream passed through the ladder successfully.

Bridge River Rapids, Fraser River.—A temporary delay of sockeye salmon at these rapids caused some concern and it was considered necessary to have an inspection by an engineer. Fortunately, with the changing level of the water the situation had eased up considerably by the time the engineer reached the ground and the accumulation of salmon had passed upstream. There is no foreign rock in these rapids and passageways at different levels have been excavated along the shoreline. It is known there are certain delays when the water level has not quite attained the level of one of these passageways but with a moderate fluctuation either way the right volume of water is found to be flowing through one of these passages and the salmon pass by. As a result of various works in past years the passage of salmon through the Bridge River Rapids is easier than nature made it.

FISH CULTURAL ESTABLISHMENTS

Due to limited appropriations, very little work involving capital expenditure was undertaken, but in addition to the usual maintenance the following works were undertaken.

NOVA SCOTIA

Bedford Hatchery.—During the previous year the well, from which the domestic supply for the dwelling was obtained, was destroyed by excavations for the reconstruction of the highway. As the well was not on the hatchery property, the department had no recourse but to provide a new supply. This was obtained by drilling a well near the dwelling. Nine new hatching troughs and four foot-troughs were installed in the hatchery.

Grand Lake Rearing Ponds.—A survey for the re-establishment of the property lines was completed and the locations of the buildings were established.

Middleton Hatchery.—The property lines were re-established by survey and positions of all buildings located.

Margaree Hatchery.—A partial survey of the hatchery grounds to establish the location of buildings, ponds, etc., was completed.

Lindloff Hatchery.—An examination was made to determine the possibility of extending the rearing pond system at this hatchery. The available ground

that is at a sufficiently low elevation to permit a gravity supply is all on a rather steep sidehill. Contour surveys of two possible sites were completed, the information from which indicates that it will be feasible to establish additional ponds, although the cost may be somewhat higher due to the necessity of "benching" to provide the needed level ground. It is however planned to have the hatchery staff use any spare time on this work during the coming season, and such work as may be accomplished will reduce the actual cost of the development, when it is eventually undertaken.

Rearing Pond Sites.—Complete surveys of sites which had previously been suggested by fish cultural officials as being suitable for the establishment of rearing ponds were made at Sissiboo River, Digby County, Barnes Brook near Bear River, Digby County and Falls Brook, Kings County.

Yarmouth Hatchery.—It was necessary to rebuild the entire underwork and flooring of the dwelling verandah, which had completely rotted.

NEW BRUNSWICK

Charlo Hatchery.—A general inspection of the plant was made and a survey of a bad turn in the road from Charlo station to the hatchery, with a plan for improving it, were completed.

Miramichi Hatchery.—The boundaries of the hatchery property were re-established on the ground and new corner posts set. Extensive damage occurred to the cribwork at the lower end of the salmon retaining pond during a severe storm in the previous autumn. Abnormal tides which caused damage all along the coast lifted the cribwork from its foundation and it was necessary to take it down and rebuild it. As work could only be carried on when the tide was low, considerable delays were involved, but it was finally completed in a manner which, it is hoped, will afford protection against the damage recurring.

Florenceville Hatchery.—A rapid thaw and heavy rain caused an unprecedented freshet in the stream on which the hatchery supply dam is situated. The water rose so fast that it was impossible to get the stop-logs out of the gates in time to prevent a washout of the embankment. This was repaired and, as a means of preventing a recurrence, one of the gates was re-designed to lift from the bottom with apparatus for lifting. The hatchery building was re-roofed.

Grand Falls Hatchery.—Plans for double garage to replace two temporary buildings now used for housing the truck and officer's car were prepared, but, due to lack of funds, construction was deferred. The same condition as regards flooding, which caused a washout at the Florenceville Hatchery dam, was responsible for the creek at this hatchery overflowing its banks and flowing down over a portion of the hatchery property. A survey was made for extending one wing of the dam to prevent a recurrence of this trouble.

St. John Hatchery.—Consideration was given to the possibilities of increasing the rearing pond facilities by the establishment of circular ponds. Plans of two pond systems were prepared and submitted to the Fish Culture division. It was necessary to put a new decking on the bridge crossed by the road from the main highway to the hatchery property. Several other renewals including a supply tank to the outside rearing tanks, the erection of a flag pole and steps to the dwelling were completed.

PRINCE EDWARD ISLAND

Kelly's Pond Hatchery.—The dwelling at this hatchery never had a cellar or any means of heating except by stoves. As the foundation walls, of sand-

stone, had become so badly eroded that renewal was necessary, it was decided to excavate a cellar and put in concrete foundation walls. Due to the springy nature of the ground, it was necessary to provide adequate drainage under the cellar floor which was laid in concrete. A hot air furnace was installed to provide for heating and a pneumatic pressure system for the domestic water supply. A complete survey of the hatchery property with the locations of all buildings was completed.

OYSTER CULTURE

The leasing of ground for oyster farming was continued during the year under review, both in Prince Edward Island and Nova Scotia.

In Prince Edward Island a total of 90 leases were completed. The total number of leases issued since leasing started was 864, while 280 have been cancelled for various reasons leaving 584, having a combined area of 1,653 acres, in effect. In addition, 790 applications were before the department for consideration.

The action on an application before it is approved includes investigation of the area it covers in order that the applicant may be advised of the prospects before making an investment. Following approval, the area is surveyed and a proper description obtained for inclusion in the lease. Various factors may cause delay, after an application is received, before the lease is completed, such as delay on the part of the applicant to proceed, and the fact that surveys can, in many instances, be made only during fine and reasonably calm weather in summer and during fine weather in winter. This is partly responsible for the large number of uncompleted applications.

In Nova Scotia 91 leases were completed, making a total of 134, having a combined area of 321 acres, in effect at the end of the year, while 81 applications were being considered.

A total of 121 surveys for new leases and three re-surveys of areas of old leases, the corners of which had been lost, were completed in Prince Edward Island during the year, while in Nova Scotia 80 surveys for new leases and seven re-surveys were undertaken.

In addition to surveys for leases the following were completed:

(1) Heavy storms in recent years had so eroded the shoreline around Malpeque Bay that a number of the concrete control monuments used for the location of leaseholds had been washed out. As this number kept increasing from year to year it became more inconvenient and difficult to properly locate the areas and it was accordingly decided to replace those which were most frequently used. Fifteen new monuments were set at safe distances from the shore and triangulation surveys to establish their co-ordinates in relation to the grid, on which areas in Malpeque Bay are laid out, were completed.

(2) Triangulation, stadia and topographic surveys were completed of Vernon, Orwell, Percival, Enmore and Conway Rivers, and Frederick Cove, all in Prince County, Prince Edward Island, and plans prepared as a basis for establishing the locations of areas for leases in these inlets.

(3) The areas in Bideford on which lessees are permitted to pick small oysters for stocking their leaseholds were resurveyed.

(4) The area reserved for leasing for experimental and demonstrational purposes was resurveyed.

(5) A land survey was completed of additional land which was acquired by the Fisheries Research Board in connection with the biological station at Ellerslie, Prince Edward Island.

(6) Three concrete reference monuments, for use in connection with the establishment of areas to be leased in Summerside Harbour, were placed.

(7) The areas in Johnston's River and Fullerton Creek, Queens County, to be reserved for mud-digging, were surveyed.

(8) Areas reserved for mud-digging in the Malpeque Bay area were resurveyed.

(9) Five triangulation monuments to be used in connection with a survey of South Basin River Denys, Bras d'Or Lakes, were placed.

(10) A triangulation, stadia and topographic survey of a portion of Buctouche Bay, New Brunswick, was completed and plans prepared as a basis for establishing the locations of areas for leasing.

(11) An area reserved by the department in Buctouche Bay for experimental work in the relaying of oysters taken from polluted parts of the bay was surveyed.

(12) A survey was completed of an area in Shediac Bay which the department had reserved from public fishing for the natural propagation of oysters.

A detailed report of oyster cultural work under the department will be found in Appendix No. 4.

MISCELLANEOUS

Sooke Traps.—The fisheries enquiry into the trap net situation called for the preparation of maps and plans showing locations and construction details of the structures. Several of these were prepared for exhibits and, after the finding, plans were prepared showing the nature and detail of the enlarged escape gate recommended by the commissioner.

Area 17.—Discontinuance of seining operations in Area 17 at the mouth of the Fraser River was the cause of a complaint by gillnet fishermen that the pile beacons which had been placed on the Sandheads, four in number, caused damage to their nets and it was felt they should be removed. The department acceded to this request and removal was authorized. Specifications were accordingly prepared and tenders called. The lowest tender was received from the firm of Horie Latimer Construction Company, Limited, and the contract was awarded to this firm. The work was satisfactorily completed.

Cultus Lake Fence.—At the request of Dr. Thompson, Director of Investigations of the International Pacific Salmon Fisheries Commission, a careful examination was made of the Cultus Lake fry counting fence and a report submitted to him dealing with its condition and recommendations towards certain repairs which appeared necessary. This fence has outlived the time period for which it was designed and extensive repairs are required if it is still to be maintained in use both from the point of utility and danger to employees.

General.—The Engineering Branch dealt with all correspondence in connection with the department's oyster cultural work in the Maritime Provinces, as well as that in connection with engineering works there and in British Columbia. Plans, specifications and estimates were prepared for works undertaken during the year. District maps were brought up to date and plans and sketches prepared, as required, in connection with license areas or to illustrate correspondence. A new map of the Queen Charlotte Islands compiled from the various recently issued charts, was completed. This map is now up to date and is the one wholly compiled from authentic surveys.

APPENDIX No. 4

REPORT ON OYSTER CULTURE WORK UNDER THE DEPARTMENT OF FISHERIES FOR THE YEAR 1940-41

By A. W. H. Needler, Fisheries Research Board of Canada

In the fiscal year 1940-41 oyster culture work was carried on by the Department of Fisheries in Prince Edward Island, Nova Scotia and New Brunswick. Work under the present program has been in progress in Prince Edward Island since 1928 and in Nova Scotia since 1934. In New Brunswick investigations were carried on in the Shediac area in 1932 and 1933 but development was postponed on account of uncertainties in the situation regarding public health control and work was not resumed until 1940.

The Dominion Government by an agreement with the Province of Prince Edward Island in 1928 obtained jurisdiction over the Province's oyster areas and undertook to develop its oyster industry. As the most important step in that direction the establishment of oyster farming was planned in those suitable areas which did not support a public fishery. Experimental oyster farming was commenced by the department in 1928 and scientific investigations by the Fisheries Research Board (then the Biological Board of Canada) in 1929, and these have been continued in close co-operation. The leasing of oyster ground was started in 1931 and development of oyster farming has been rapid, especially in the Malpeque Bay region. For a more detailed review of the earlier course of the program reference may be made to appendices of earlier annual reports of the Department of Fisheries.

In 1936 the Dominion Government entered into an agreement with the Province of Nova Scotia similar to that made with Prince Edward Island in 1928. Jurisdiction over the oyster areas of the province was transferred to the Dominion which undertook development of the industry. Intensive investigations of the conditions for oyster culture were commenced in 1936 in the two important regions—the Bras d'Or Lakes of Cape Breton and the Gulf of St. Lawrence coast of the mainland. Ground was first offered for lease in February, 1938, and development of oyster farming has now commenced on a small scale.

In New Brunswick jurisdiction over Shediac Bay alone was transferred to the Dominion Government in 1931. Conditions for oyster culture were investigated in 1932 and 1933 and these investigations were resumed in 1940. Other areas in Kent and Westmorland Counties were also given some attention and a special attempt was made to relieve the acute situation at Buctouche caused by the closure of fishing grounds on account of sewage pollution.

The greatest development of oyster farming has been in the Malpeque Bay region and investigations and experimental farming in co-operation with the Fisheries Research Board have centred at the Prince Edward Island Biological Station at Ellerslie. General headquarters for the work as a whole have been maintained there and much of the information and experience gained in Prince Edward Island is applicable in Nova Scotia and New Brunswick. Intensive work is in progress in the Bras d'Or Lakes near Orangedale, on the Northumberland Strait coast at Malagash, and at Shediac, to study the special problems of those regions. While the work is, for convenience, reported below separately for the three provinces, it is made one by the common planning and by the use of personnel and other resources in common.

While the general prospects for the oyster farming industry are good it is still at an early stage of development. There has been much effort to grow oysters but even in the Malpeque Bay region where the development first started about as much money is still being spent as is being received for the oysters sold. The industry is only now approaching a mature stage where the total receipts exceed the total expenditures.

With the prospect for increasing production marketing is important. Although oysters could be readily sold at a relatively high price in 1940 because of the release of funds through war expenditures and because of an embargo against importations from the United States the development of markets over a long term needs attention. The final establishment of a stable industry depends both on economical methods of culture and on adequate marketing. Special attention was given in 1940 to establishment of uniform and reliable grading and inspection.

The war has affected interest in oyster culture and availability of funds for private investment through change in the occupation or the financial circumstances of those engaged in the industry. The further effects of the war remain to be seen but when this report was prepared there was no definite prospect of the industry being seriously affected in any permanent way. As oyster farming is a long term activity in which production cannot be expanded quickly and in which work must be done now to produce oysters about five years hence continued supervision is needed and private effort should not be reduced too drastically.

A.—PRINCE EDWARD ISLAND

In 1940-41 private oyster farming was continued on about the same scale as in 1939-40, although actual expenditure was reduced. It was still limited largely to the Malpeque-Cascumpeque region, work on any considerable scale being carried on elsewhere only in Bedeque Bay. The effects of oyster mortality are still felt in the Charlottetown region and elsewhere but there seems to be a resumption of interest based partly on the prospects for re-establishing the industry by planting Malpeque oysters resistant to the disease. Oyster farming was continued on a very small scale in other outlying areas.

The development of oyster areas under cultivation in Prince Edward Island to 1939 is summarized in a table in the Report on Oyster Culture for 1939-40.

Malpeque-Cascumpeque Region.—This is the region where oyster farming was first established under the present program and where the benefits of experimental farming and other activities of the department have been felt most directly. The industry has, therefore, reached a more advanced stage here than elsewhere.

As shown in Table I it has just passed through a phase of rapid expansion when large expenditures were made which are expected to result in greatly increased production in the near future. Expenditures were reduced in 1940 but operations were continued on a large enough scale for a much greater yield than at present. Production in 1940 was slightly greater than in 1939 and the industry is passing from the investment to the self-sustaining stage. Only when it shows worthwhile profits can it be considered firmly established but this is expected soon. As it takes five years to produce high quality oysters by spat collection and rearing, the rapid increase in effort from 1935 to 1938 should lead to an increase in production in the years following 1940.

It is noteworthy that in 1940 the expenditure was reduced much more than the actual cultural work as measured by the oysters planted and the spat collectors exposed. This is explained partly by the fact that the large expenditures in 1938 included a high proportion of capital expenses by those starting work on a large scale as distinct from operating or maintenance

expenses of those already established. It is also due in part to the development of improved methods and the better application of those already available. Lack of experience led at first to waste which is being greatly reduced.

TABLE I.—OYSTER FARMING IN THE MALPEQUE-CASCUMPEQUE REGION, 1935 TO 1940

	1935	1937	1938	1939	1940 ¹	*Total 1935-40
1. Barrels of oysters planted.....	1,303	3,192	5,968	5,630	5,337	24,772
2. Concrete-coated spat collectors used (egg-crate fillers or their equivalent).....	3,350	55,600	98,000	71,700	82,500	324,750
3. Barrels of oysters sold.....	979	1,948	3,451	3,224	3,251	13,946
4. Receipts from sale of oysters (estimated at \$8 per bbl.).....	\$7,822	\$15,584	\$27,608	\$25,792	\$26,008	\$111,568
5. Wages paid by oyster farmers.....	\$2,137	\$11,532	\$17,971	\$17,340	\$12,485	\$ 67,542
6. Money spent for materials used.....	\$1,665	\$14,305	\$27,484	\$21,022	\$ 8,914	\$ 80,741
7. Total cash expenditure.....	\$3,802	\$25,837	\$45,455	\$38,362	\$21,399	\$148,283
8. Days' work by lessees or unpaid assistants.....	1,126	4,300	7,022	5,315	5,085	26,169
9. Value of (8) at \$1.75 per day.....	\$1,971	\$ 7,525	\$12,289	\$ 9,302	\$ 8,899	\$ 45,798
10. Total expenditure.....	\$5,773	\$33,362	\$57,744	\$47,664	\$30,298	\$194,081
11. Excess of total expenditure over receipts.....	—\$2,059	\$17,778	\$30,136	\$21,872	+\$4,290	\$ 82,513
12. Excess of cash expenditure over receipts.....	—\$4,030	\$10,253	\$17,847	\$12,570	—\$4,609	\$ 36,715

¹ Figures for 1940 not quite complete when report prepared.

* Include 1926 figures which are not shown in detail.

Although the possibility of making oyster farming pay in this region has been demonstrated by both the department and the industry, there is still room for improvement. Continued effort is needed to develop the cheapest and best methods possible, to educate oyster farmers in those methods and to adapt administrative policies to the industry's needs. Even in this region where the industry has reached the most advanced stage, its expenditures since 1935 have exceeded its receipts by more than \$75,000.

In the Report on Oyster Culture for 1939-40, figures were presented showing that those operating on a small scale obtained in 1938 a greater return in proportion to their expenditures than did the large operators. Not only did the poor man benefit by wages paid by the latter but alone was able on the average to cover cash expenses and make some return for his time.

The Fisheries Research Board, in co-operation with the department, made predictions again in 1940 of the settlement of oyster spat in several areas. The industry in this region has made thorough use of these predictions and the service is a valuable one which should be continued.

Mortality of Oysters.—The history of the serious mortalities of oysters, which have occurred during the past few years in the Charlottetown region and in Enmore and Percival rivers, and the evidence of the resistance of Malpeque stock have been reviewed in the reports on oyster culture for 1938-39 and 1939-40.

Investigations in 1939 provided further evidence of the resistance of Malpeque stock to the disease. Malpeque oysters have now been held for three years in close proximity to native survivors of the disease in Brackley Bay and Enmore River. Although the natives showed poor survival and growth, the Malpeque oysters have suffered no serious mortality either in these experiments or in several other transfers to areas affected by the disease.

At Johnston's River in the Charlottetown area 100 barrels, and at Enmore river 20 barrels, of Malpeque oysters were planted early in 1939 in the hope that they would dominate spat production in these small isolated inlets so that spat, most of which was resistant to the disease, could be collected. The oysters have survived and spat has been collected and held to determine its survival.

The mortality destroyed the results of oyster farming which had been carried on in the north shore bays near Charlottetown up to 1936. It also discouraged any new attempts there or in other areas where the occurrence of the disease was feared. On the other hand it destroyed the public fishery in the tributaries of Hillsborough Bay and in Enmore and Percival rivers and eventually led to interest in oyster farming as a possible means of re-establishing oyster production in these inlets. Thus, although the mortality destroyed the results of oyster farming previous to 1936 in the affected areas and although it has prevented any considerable development in almost all inlets outside the Malpeque-Cascumpeque region, interest in oyster farming remains and has recently increased. This is due largely to the accumulation of evidence that Malpeque oysters are resistant to the disease and can be used to establish oyster farming in the affected areas. It is also due in part to the natural production of small oysters which suggests an imminent natural recovery. The latter may, however, be misleading as experience has shown that a high mortality is to be expected among such oysters before they reach marketable size.

The department allowed those who had already had leases or approved applications in areas affected by the disease to hold them without development work or payment of rentals. With the strong evidence that Malpeque oysters survive in these areas, the department has now again required that lessees and applicants satisfy the ordinary requirements if they are to retain their areas.

The department is also making Malpeque stock available to oyster farmers in the areas affected by the disease. As stated above, it is attempting to establish sources of resistant spat at Johnston's River and Enmore River. It also offers spat and small oysters for sale from reserves in the Malpeque Bay region. Planting stock is already in such demand there that private sources cannot be relied on to supply outside demands. The resistance of the Malpeque stock to the disease gives it a special importance as the safety of the industry as a whole may depend on a high production in that region.

Bedque Bay.—In 1940 about 775 barrels of oysters from Summerside harbour were relaid for purification in Salutation, Sedgewick and Sunbury coves, and about 680 barrels were marketed from the latter. Fewer were relaid but more marketed than in 1939 and operations were again more profitable than in the preceding year.

Provision of Planting Stock.—The department offers for sale to lessees both spat and small oysters. In so doing it attempts to make them available to as many as possible and to avoid providing any considerable proportion of the planting stock used by those already established who should develop their own sources. In 1940 the demand was relatively low and only 26 barrels of small oysters and the spat from about 1,300 cardboard collectors were sold by the department.

The policy of issuing permits to lessees to pick oysters for stocking purposes in the shallow shore zone where winter mortality is high was continued in 1939. This policy has led to the transfer of large quantities of oysters into deeper water thereby saving them from the winter killing which would otherwise have destroyed a large proportion.

B.—NOVA SCOTIA

The two oyster-producing regions of Nova Scotia—the Bras d'Or Lakes and the Gulf of St. Lawrence coast—have conditions and problems widely different from each other and from the north shore bays of Prince Edward Island, where investigations were commenced first. Intensive investigations have, therefore, been necessary to adapt cultural methods to the special local conditions. The two regions are considered separately below.

As the agreement between the Dominion Government and the Government of Nova Scotia was not completed until 1936 the present oyster culture program in the province is at an earlier stage. Development has apparently been retarded to some extent by diversion of effort to war purposes. Actual private oyster farming has as yet commenced on only a very small scale and even decreased slightly from 1939 to 1940. An attempt is being made to prepare for greater activity in the future by solving as many of the difficulties as possible and by assessing the opportunities.

BRAS D'OR LAKES

A preliminary survey of the oyster areas of the Bras d'Or Lakes was made in 1934 and some minor supplementary investigations in 1935. Intensive investigations were commenced in 1936 and ground was offered for lease in 1937.

The general prospects for profitable oyster culture in the Bras d'Or Lakes are not very good unless the marketing of the oysters can be permanently improved. The conditions for the production of oysters in this region are now well known and may be summarized as follows: Spat production is excellent but growth is slow and the oysters tend to be fresh in flavour and to have thin meats and soft shells. Production may be cheap in spite of slow growth but the quality of the oysters can satisfy only relatively low-priced markets.

Production Problems.—The investigations carried on since 1934 have shown that both natural spat production and artificial spat collection are highly successful in this region. Great quantities of small oysters are produced along the shores, largely from settlement of spat on eelgrass, and provide a source of planting stock. Spat collection methods suitable to the region have developed and conditions in the region are excellent for this purpose both as regards shelter from damage by storms and actual numbers of spat which settle. The source of seed oysters does not, therefore, present a serious problem or limit production.

Successful spat collection in the Bras d'Or Lakes and the survival of the spat in other areas in Nova Scotia and New Brunswick have been demonstrated. Tests in 1940 showed that the Bras d'Or Lakes spat could be separated from the collectors by machine without serious loss in spite of the softer shells of the region. Spat was collected by the department in 1940 for sale to lessees in outside areas where adequate local supplies of seed stocks have not been developed. The region may become an important source of seed stock for use elsewhere.

Because the oysters of the region have relatively weak shells, thin meats and fresh flavour their value is low. Experiments have indicated that, although transfer to areas with saltier water improves the flavour, really good oysters for the shell trade do not result for some time and the increase in value does not cover the expense. Because high quality oysters cannot be produced and reliance must therefore be placed on low-priced markets, an attempt is being made to develop the cheapest possible production methods. The future of the industry in this region seems to depend on the production of oysters at such a low cost that they can be sold profitably at low prices.

Marketing Problems.—The most serious problem of the industry is to improve marketing rather than production. When sold in the shell the oysters

realize low prices and command only an uncertain market so that production is discouraged. Although an unusually good general demand for oysters improved marketing in this region in 1940 the situation has not improved fundamentally and may be expected to deteriorate as production of high quality oysters is increased elsewhere. Since relatively good oysters for sale in the shell cannot be produced in this region sound improvement can be expected only if other outlets can be developed to provide a more reliable market.

In 1939 the Department of Fisheries and the Nova Scotia Marketing Board co-operated in an attempt to explore the possibility of marketing Bras d'Or Lakes oysters shelled and in bulk. In the trials conducted in 1939—for further details of which see the report on oyster culture for that year—the quality of the product was high enough to compete with oysters imported from the United States but the yield of oyster meat per barrel was low and a return of only \$1.50 per barrel was realized.

The trial was repeated in 1940 on the same basis as in 1939—the department providing equipment and instruction, the Nova Scotia Marketing Board assisting in marketing and a local association of oyster producers providing the oysters and doing the actual work. By reducing the labour cost and improving the marketing a return equivalent to \$2.70 or almost twice as high as in 1939 was obtained even before the embargo was placed on the importation of shelled oysters from the United States. These results are encouraging and suggest that the utilization of this market may improve the general prospects in the region.

Leasing of Oyster Grounds.—At the end of 1939-40 applications for oyster leases to the number of 165 had been received of which 122 had been examined and approved and 96 surveyed. By the end of 1940-41 the total had reached 177 of which 159 had been approved and 157 surveyed. The policy of leasing only grounds capable of producing relatively good oysters for the region was continued.

Development of Leased Areas.—Private oyster farming in this region in 1940 is summarized in Table II. It shows little change from the previous year. The cash expenditure was reduced but slightly more work was done, more oysters were planted and the sales of oysters were about the same. The value of the oysters sold exceeded the cash expenditure and approximated the total expenditure.

TABLE II.—DEVELOPMENT OF OYSTER AREAS UNDER CULTIVATION IN NOVA SCOTIA IN 1940

Region	Number of Areas under Cultivation	Approximate Total Area	Oysters Planted	Oysters Sold	Wages Paid for Development	Money Spent for Materials	Days' Work by Lessees	Value of Time by Lessees at \$1.75 per Day	Total Value of Work and Materials
		(acres)	(bbl.)	(bbl.)	\$	\$		\$	\$
Bras d'Or lakes.....	103	221	218	393	18	276	401	702	1,096
Merigomish harbour....	2	3	3	0	15	10	8	14	39
East River, Pictou Co.	4	20	18	0	75	70	43	75	220
Caribou harbour.....	10	34	146 ¹	101 ¹			104	182	182
Brule and Barachois									
bays.....	2	2	34 ²	24 ²					
Malagash bay.....	8	26	25	140	20	43	224	392	455
Wallace bay.....	2	6							
Total, Northumberland Strait.....	28	91	226	265	110	123	379	663	896
Grand Total.....	131	312	444	658	128	399	780	1,365	1,992

NOTE.—(1) Including 94 bbls. relaid.

(2) All relaid.

The picking of small oysters in shallow water along the shore was permitted again in 1940 and about 218 barrels were obtained by lessees and planted on their areas.

Northumberland Strait

In this region conditions are suitable for the production of higher quality oysters than in the Bras d'Or Lakes and the principal problems concern production rather than marketing. It differs from both the Bras d'Or Lakes and the north coast of Prince Edward Island in its large tides which make tidal flats of great importance both in the natural production and in the potentialities of the region for oyster culture.

A preliminary survey of the region was made in 1936 and intensive investigations were commenced in 1937 and are still in progress centred at Malagash where areas are reserved for experimental farming. They are reported in greater detail in the section below on experimental farming and investigations.

The Department of Fisheries and the Fisheries Research Board again co-operated in 1940 in the survey of the shore mollusc resources of this region which was commenced by the Nova Scotia Economic Council in 1939 and concluded in 1940. The detailed and extensive knowledge obtained in the survey will be valuable in formulating policies and in detailed administration.

Leasing of Oyster Ground.—In this region no leases are being issued of areas now producing oysters in commercial quantities and some applications have been refused on this basis. To the end of 1939 over 45 applications had been received of which 34 were approved and 25 surveyed. By the end of 1940 the total had reached 54 of which 36 were approved and 35 surveyed.

Development of Leased Areas.—Private oyster farming in this region in 1930 is summarized in Table II. Its development has been retarded by uncertainty regarding methods suited to the special local conditions, by limited sources of planting stock and by the diversion of effort caused by the war.

Some progress is being made at Malagash, in Caribou Harbour and in East River where about 95 barrels of oysters were planted in 1940, principally as a result of picking small oysters occurring naturally at high levels. At Malagash the production was largely from former provincial leases but some development work has been commenced on new areas.

At Caribou Harbour and at Brule about 128 barrels of oysters from polluted areas in Pictou Harbour were relaid for purification, accounting for about 110 barrels marketed from those two inlets. Less oysters were relaid than in 1939 probably as a result of the opening of the oyster areas in West River, Pictou Harbour, to direct marketing.

C.—NEW BRUNSWICK

In New Brunswick the Shediac area alone was transferred to Dominion jurisdiction in 1931. Some work was carried on in 1932 and 1933 but was discontinued owing to the uncertainty of the public health situation. An agreement was under consideration in 1940 by which the remaining oyster areas of Kent and Westmorland Counties would be transferred to Dominion jurisdiction. There is a demand for increased work in this province with special attention to public health problems which are particularly acute at Buctouche. Work was commenced in 1940 both on the public health problems and on the general problems of oyster production.

Public Health Problems.—A considerable proportion of the public fishing grounds at Buctouche, Cocagne and Shediac have been found to be so dangerously polluted that direct marketing of oysters during open water should be prohibited. It has, therefore, become necessary to provide for the use of oysters from polluted areas if the fishing is to be maintained on nearly its present scale.

In 1940 investigations in co-operation with the Department of Pensions and National Health have indicated that the bacterial content of oysters in polluted areas is so reduced during the winter that oysters from some of these areas may be safely marketed during the winter. This has relieved the situation to some extent but only part of the polluted areas can be fished through the ice.

Methods of purifying oysters from polluted areas require further study. Investigations were commenced in 1940 but need to be continued in order to develop the best possible technique for the relaying of polluted oysters in relatively pure water and their recovery for the market. The expense of this process though not prohibitive is sufficient to remove much of the profit.

Development of Oyster Farming.—It is believed that in this region as elsewhere oyster farming can increase the production and improve the quality. Investigations of the potentialities of the region from this point of view were commenced in 1940 and need to be continued if oyster farming is to be developed there. There is local demand for an effort in this direction.

D.—GENERAL

Revenue from oyster culture for the past three years is summarized in Table III. It had increased steadily to 1939 but showed some reduction in 1940 when it amounted to just over \$8,000. The reduction was due to somewhat reduced sales of oysters from the department's experimental areas in Prince Edward Island. Although fluctuations will doubtless occur it is expected that the revenue, including rents and royalties, will continue its long term tendency to increase although probably not as rapidly as during the past few years.

The revenue from oyster culture cannot be spent on oyster culture. It reduces the net cost of the work to the government considerably below the total expenditure. In 1940-41 the appropriation was \$24,000 but through economy the expenditure was limited to less than \$20,700 and the revenue reduced the net cost to about \$12,600.

TABLE III.—REVENUE FROM OYSTER CULTURE, 1940-41

	1940-41		Cf. 1939-40	
	\$	cts.	\$	cts.
Sale of 2,448 cardboard collectors bearing spat at \$0.15.....				367 20
Sale of 17 bbls. collectors with spat at \$0.75.....				12 75
Sale of wire containers for spat collectors.....				3 10
Sale of 336 2/7 gals. separated spat at \$0.70.....	235	40		
Threshing spat from 1,004 collectors at 2 cents each.....	20	08		
Sale of 26 bbls. small oysters for stocking areas at \$3.00.....	78	00	333	00
Sale of market oysters from experimental farm:				
102 bbls. ordinary oysters at \$6.90 (\$6.65 1939-40).....	703	80	1,130	50
315 bbls. ordinary oysters at \$7.00 (\$7.10 1939-40).....	2,205	00	1,072	10
95 bbls. medium oysters at \$9.66 (\$9.30 1939-40).....	917	70	2,287	80
50 bbls. select oysters at \$12.16 (\$12.05 1939-40).....	608	00	1,729	18
51 bbls. select oysters at \$12.20.....	622	20		
12 bbls. select oysters at \$12.30.....	147	60		
Sale of 36 bbls. oysters from Buctouche bay, N.B., at \$6.00.....	216	00		
Fees for re-surveys of boundaries of leases.....				27 50
Royalty on oysters taken from leases and rentals on leases.....	2,308	50	2,044	01
Total.....	8,062	28	9,007	14

Most of the revenue was from Prince Edward Island. Excluding general expenses, equally applicable to all provinces and amounting to about \$2,200, the net cost of the work in 1940-41 was about \$1,300 in New Brunswick, about \$5,700 in Nova Scotia and about \$3,400 in Prince Edward Island. Thus,

although the total volume of work is necessarily greater in Prince Edward Island, the greater revenue there reduces the net cost below that in Nova Scotia where the development is at an early stage.

Investigations and Experimental Farming

The Department of Fisheries in 1940 continued investigations and experiments in close co-operation with the Fisheries Research Board. These are designed on the one hand to determine the potentialities of oyster areas and provide a sound basis for administration and development, and on the other to develop and demonstrate the most suitable cultural methods. The department has tested on a commercial scale methods resulting from scientific investigations.

The great development of oyster farming, which has not yet reached a mature stage, makes it important to develop and demonstrate further improvements in methods. Our knowledge must be made to keep pace with the changing needs of the industry which has shown to a high degree the co-operation necessary to make the results of this work successful. It has shown an eagerness to try new methods and oyster farmers have themselves developed improvements in practical technique.

Headquarters for all experimental oyster farming by the department and the board are maintained at Ellerslie where areas have been set aside for that purpose on a tributary of Malpeque Bay and where the board has established the Prince Edward Island Biological Station. The special needs of other localities are, however, borne in mind. Many of the results obtained at this central experimental farm are applicable elsewhere but investigations, demonstrations or provision of stock are carried out elsewhere to meet special local needs. Thus in 1940 investigations were continued at Orangedale and Malagash, Nova Scotia, where an attack is being made on the special problems of the Bras d'Or Lakes and the Gulf of St. Lawrence coast of Nova Scotia. Investigations were carried on at Shediac and Buctouche, in the Charlottetown region and to a lesser extent elsewhere. The extension of intensive work to outlying areas is, however, limited by expense and availability of trained personnel.

Results of Investigations and Experiments.—The results of investigations and experiments are reported in greater detail elsewhere, especially in bulletins and circulars of the Fisheries Research Board. Only the salient features of this work in 1940 can be mentioned here.

Predictions of the settlement of oyster spat were made in 1940 for the third successive year in the Malpeque-Cascumpeque and Bedeque Bay regions. In connection with this work additional knowledge has been obtained on the settlement of other mollusc larvae including mussels which must be avoided in collecting spat.

Progress has been made towards an understanding of the factors controlling the "fatness" of oysters—an important factor in determining their value. Investigations have shown the importance of temperature, "fattening" occurring principally between about 60° and 68°F. with less improvement at higher temperatures. This investigation is being continued and will be extended to determine the effects of transplanting or disturbing oysters at various seasons. The results are expected to be of direct practical value.

As mentioned above, investigation of the disease responsible for serious oyster mortalities in Prince Edward Island has been continued and has led to further confirmation of the resistance of Malpeque oysters. The survival of spat and small oysters in areas affected by the disease is being studied and two attempts to establish the resistant Malpeque strain are being made.

A study of the quahaug's life history, which was continued by the Fisheries Research Board in 1940, has yielded results bearing significantly on its conservation and culture. The prospects for profitable culture seem very poor and a side line which has been considered by oyster farmers is thus discouraged.

Experimental farming operations at Ellerslie were self-sustaining in 1940 and yielded a profit of a few hundred dollars in 1939 although not designed primarily to be profitable.

At Malagash, N.S., where a reserve has been set aside for experimental purposes and where a permanent foreman is employed, special attention has been given to the potentialities of tidal flats for oyster culture. In 1940 further evidence was obtained on the value of a dyke, which retains a maximum of about eighteen inches of water, for improving winter survival, the mortality over winter inside the dyke being only about one-tenth of that on similar bottom outside. The exposure of concrete-coated cardboard spat collectors in bundles suspended from staging over flats bared at low tide was tried in 1940 and proved successful in avoiding both silting and damage by wave action. General problems of spat collection and rearing on tidal flats are being studied.

The oyster drill, *Urosalpinx cinerea*, occurs at Malagash and at some other places about Northumberland Strait, and may be a serious enemy of the oyster. Its distribution and habits have been studied to determine how to avoid transferring it to new areas and how to keep the damage it causes at a minimum.

In the Bras d'Or Lakes, where spat collection problems have been largely solved, experiments are in progress in which oysters are being reared on brush in an attempt to reduce expenses to a minimum. The survival of Bras d'Or Lakes spat separated from cardboard collectors by machine has been found satisfactory and a machine has been developed for removing the spat which settles on eelgrass. Experiments in the production and marketing of shelled oyster meats are reported above.

In addition to the investigations at Buctouche and Shediac on problems of contamination and purification of oysters, preliminary attention has also been given to the potentialities of areas in Kent and Westmorland counties, N.B., for oyster culture. Investigations at Shediac indicate that the frequent failures in spat production there are caused by removal of larvae from the inlet by currents.

In addition to the above and other investigations of less importance in 1940, the exploration of oyster areas has continued in all three provinces as a necessary preliminary to the formulation of administrative policies or to the leasing of oyster grounds.

Grading and Inspection

The improvement of the grading and packing of oysters is essential to the sound expansion of marketing which will be necessary as oyster farming increases production. There is much room for improvement in this regard on the Canadian Atlantic coast, a great number of grade designations being used, none of which are applied in the same way by many packers, and cleaning, packing and grading often leaving much to be desired.

In 1940 progress was made towards the establishment of uniform grades to be supported by inspection. A survey was made of the grading now carried on, involving interviews with a majority of the packers. Based on the findings and on measurements of graded oysters, four grades as regards shape were defined, to be called "Fancy", "Choice", "Standard" and "Sub-standard". These were discussed with representatives of the trade and it is proposed that they be defined by regulation so that those grade names can be used only on oysters which have been inspected by one of the department's officers and found

to conform to the requirements for the grade concerned. In this way provision is made for the division of the entire production of oysters in the shell into four graded shapes which will be kept as uniform as possible by inspection.

It is proposed to attempt to improve the packing, as well as the grading, of Canadian Atlantic oysters by educating the packers in satisfactory methods and by revising the requirements. The survey in 1940 revealed the need for improvement.

Public Health

The relation between the oyster industry and public health is worthy of general attention because of its great importance to administrative policy and to operations by oyster producers. The need for and nature of public health supervision, and its effects on the industry, are reviewed in the report on oyster culture for 1939-40 in which the seriousness of the problem is shown. The definition of areas which are too dangerously polluted to permit the direct marketing of oysters and the development of means for using the oysters from these areas are both of direct practical importance to the industry.

Provision has been made for some years for the purification of oysters from polluted waters by re-laying them in approved waters for a month in the warm season. The cost of this process, however, is usually so high as to remove much of the profit and every effort is needed to reduce or avoid it. In 1940-41 the Department of Fisheries co-operated with the Department of Pensions and National Health in an investigation at Buctouche of the effects of hibernation on the bacterial content of oysters. The results indicated that the content of sewage bacteria is so reduced at the low temperatures under the ice in winter that oysters may be used safely then from some areas which are too dangerously polluted to use them safely during open water. The fishing of oysters may now be permitted through the ice in some areas previously closed to direct marketing, thus avoiding the cost of re-laying for purification and increasing the value of the oysters to the fishermen.

In 1940 further examinations of oyster areas by the Department of Pensions and National Health resulted in changes in boundaries of areas considered dangerously polluted. Some areas not previously examined were found dangerously polluted and the revision of boundaries based on more detailed knowledge led in other cases to re-opening some producing areas to direct marketing. A revised list of the areas from which direct marketing is prohibited or restricted follows:—

PRINCE EDWARD ISLAND

Fishing for direct marketing prohibited in:—

Summerside Harbour: Entire producing area.

Charlottetown Harbour and Tributaries: Over half of producing area.

Vernon and Orwell Rivers: About half of producing area.

Mill River: Most of producing area.

Pinette River: Much of producing area.

All of these unimportant areas—Haldimand River, Tryon River, Victoria Harbour, Dock River.

Unimportant parts of—Malpeque Bay and Tributaries, Conway Narrows and Tributaries, Foxley River, Kildare River, Murray Harbour, New London Bay, Rustico, Tracadie, Brackley and Savage Harbour bays.

NEW BRUNSWICK

Fishing for direct marketing prohibited in:—

Richibucto River: Some of producing area.

Buctouche Bay and River: Small parts of producing area.

Shediac Bay: Small part of producing area.

Fishing for direct marketing only February 15 to March 31:—

Buctouche Bay and River: Some of producing area.

Cocagne River: Much of producing area.

Fishing for direct marketing only after November 1 in:—

Richibucto River: Some of producing area.

Buctouche Bay and River: Much of producing area.

Shediac River: All.

NOVA SCOTIA

Fishing for direct marketing prohibited in:—

East River, Pictou Harbour: Entire producing area.

Wallace Harbour: Small part of producing area.

Fishing for direct marketing only after November 1 in:—

Wallace Harbour: All of remaining producing area.

APPENDIX No. 5

**REPORT ON THE INSPECTION OF CANNED SALMON AND
PRELIMINARY WORK ON CANNED HERRING**

BY

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As indicated in the title of this report, the work of the Canned Salmon Inspection Laboratory during 1940 has been extended to include a preliminary investigation of seasonal and other variations in the quality of British Columbia canned herring. This report, therefore, consists of two sections, the first dealing with canned salmon and the second with the preliminary work that has been carried out during the past season on canned herring.

CANNED SALMON

During the past season the investigations carried out at the laboratory have again been directed mainly towards a study of the variations in the quality of British Columbia canned salmon. The object of this work has been to determine the nature and extent of the seasonal trends in the means of the different quality characteristics and the values of the standard deviations around the lines of means. This phase of the work has been extended to include the five principal species of salmon packed in British Columbia and has necessitated exceedingly extensive tabulations and calculations. These results, however, are fundamentally so important that they more than justify the expenditure of time and labour involved.

In view of the desirability of describing in detail a typical set of these results and thus making them available to the industry, it has been considered advisable in this report to dispense with tables summarizing the quality characteristics of British Columbia canned salmon similar to those given in previous reports. From the summaries given in the three previous reports (1937-38, 1938-39, and 1939-40) and from more recent data, it has now become evident that annual variations in the quality of British Columbia canned salmon are only of minor importance in comparison with seasonal variations, so that it would appear more profitable for the needs of practical grading to direct attention in future mainly to seasonal variations in quality.

The seasonal trends in the various quality characteristics of British Columbia canned salmon that have been investigated by the laboratory are based on data given in the laboratory reports of examination. In calculating the trends the data corresponding to samples packed in two of the principal fishing areas, namely, the Fraser River and the Skeena River areas, were first segregated by means of the code marks into five-day intervals. The seasonal trend in a given characteristic was then obtained by plotting the series of averages of the measurements of the characteristic appearing in the individual time intervals.

Trends derived in this way, it will be observed, represent pooled results from samples packed at a number of different canneries and, hence, the devia-

tions in the individual characteristics around the means of the respective intervals include both variations from tin to tin and variations between canneries, in addition to variations arising through differences in the locality where the salmon were caught. Such results are not altogether satisfactory for estimating values of the standard deviations around the lines of means, but, when sample sizes are taken into consideration, they furnish reliable information regarding the nature of the trend in the average and the total range in the latter over the season. Since the standard deviations of the different quality characteristics around the lines of means remain approximately constant throughout the season, the trends in the averages of the pooled results thus give all the information that is required for practical grading purposes.

Tables I to IV show typical trends in the averages of firmness, red and yellow colours of the muscle tissue, free oil and free aqueous liquid of samples of canned sockeye salmon packed in the two areas mentioned above. These data are illustrated graphically in figures 1, 2, 3 and 4. From an examination of these figures, it will be observed that the quality of canned sockeye salmon packed in British Columbia is slightly lower at the beginning of the season than that of salmon packed near the middle of the season where, in general, the characteristics, firmness, red and yellow colours of the muscle tissue and free oil attain their maximum values and the volume of free aqueous liquid reaches a minimum. Then, during the latter part of the season, the quality falls off and finally becomes very poor in samples packed during October. The apparent cyclical fluctuations superimposed upon the general trends, it should be observed, are, for the most part, due to sampling fluctuations and are consequently not significant.

In addition to seasonal variations, these data also reveal evidence of geographical variations. For example, the salmon packed in the northern area were, in general, somewhat firmer than salmon packed in the southern area. On the other hand, the sockeye caught in the southern area were better in the red and yellow colours of the muscle tissue than those packed in the northern area. Similarly, while over a large part of the season the salmon packed in the two areas were substantially the same in free oil content, the best samples packed in the southern area were better in this respect than the best samples packed in the northern area. The same is true, in general, of the free aqueous liquid.

The standard deviations around the lines of means of four of the above quality characteristics of canned sockeye salmon are shown in table V. The standard deviation, it will be recalled, forms a measure of the variation or scattering of the measures around the mean and thus furnishes a measure of the uniformity of the product with respect to a given quality characteristic. Also, when the distribution of a given quality characteristic is normal or approximately so, the two statistics, standard deviation and mean, completely determine the distribution of the characteristic. Under these circumstances it is possible to state accurately the proportion of samples falling within given limits, since in a normal distribution 99.7% of the measures lie within the limits ± 3 standard deviations from the mean, 95.4% of the measures within ± 2 standard deviations and 68.3% of the measures within ± 1 standard deviation from the mean. Also, when the standard deviation of the characteristic in the parcel or universe is known, it is a simple matter to calculate the standard deviation of the average of samples of a given size. The value of the latter is given by the formula

$$S\pi = S \div \sqrt{n},$$

where $S\pi$ is the standard deviation of the average, S is the standard deviation of the characteristic in the parcel, that is, the standard deviation in single tins or measurements, and n is the number of measurements or tins in the sample.

* All tables and figures referred to in the text are printed on pages 96-101.

Another important use of the standard deviation is in testing the significance of the difference between two averages. The formula for calculating the standard deviation of the difference between two means has been given in a previous report, namely,

$$S_d = \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}},$$

in which S_d is the standard deviation of the difference between the two means, and S_1 , S_2 , n_1 , and n_2 are respectively the standard deviations and sample sizes of the two sets of measures.

This last use of the standard deviation may be illustrated by testing the significance of the difference between the average red colour in intervals Nos. 14 and 15 of the 1938 sockeye samples packed in the southern area. The averages in these two intervals calculated to two decimal places are respectively, 6.35 and 6.74, and the corresponding sample sizes, 51 and 37. Since the standard deviation around the line of means is in each case 0.75, the standard deviation of the difference is

$$S_d = 0.75 \times \sqrt{\frac{1}{51} + \frac{1}{37}} = 0.16.$$

If the level of significance corresponds to 2 standard deviations, there will be 1 chance in 20 that the means will differ by more than $2 \times 0.16 = 0.32$ units due to sampling fluctuations. The actual difference in the two averages, however, is $6.74 - 6.35 = 0.39$ units. Hence, the difference in the average red colour between these two intervals is barely significant and is slightly greater than what might reasonably be attributed to sampling fluctuations.

The information of most value for practical grading purposes is the total range through which the average varies during the season. This is obtained from the seasonal trend by finding the difference between the upper and lower limits of the average over the season. For example, neglecting sample sizes less than three, the upper limit of the average firmness in the 1938 samples of sockeye salmon packed in the southern area was 18.8 and the lower limit, 7.0 units. The corresponding figures for the northern area were 18.5 and 10.3 units. The total range in the average firmness of the samples of sockeye salmon packed during 1938 was, therefore, $18.8 - 7.0 = 11.8$ units. In a similar way, the total range in the average of the given characteristic over a number of years is calculated by finding the difference between the maximum upper limit and the minimum lower limit in the two areas over the period in question. Since the standard deviations around the lines of trend of the various quality characteristics remain approximately constant during the season, a given quality characteristic may thus be easily and accurately graded by dividing the total range in the average of the characteristic into a convenient number of intervals.

The latter was the method followed in preparing the grading limits for grading canned sockeye salmon suggested in the *Guide to Analysis of Canned Salmon Inspection Report* published by the Department in 1940. This method has also been followed in preparing the recently completed bulletin entitled *The Evaluation of Quality of British Columbia Canned Salmon* extending the guide to analysis to coho, pink, chum and spring salmon, in which the grading limits are based on data derived from samples packed during the years 1936 to 1939 inclusive, and including other information pertaining to the quality of British Columbia canned salmon.

Illustrations of the method of applying such grading limits in the evaluation of quality of British Columbia canned salmon are given in the bulletin. A further illustration of the value of these grading limits is afforded by the following data taken from a laboratory report of a private examination carried out by the laboratory. The numbers in each case are averages and the samples one-half pound flat tins: softness (depth of penetration in millimetres), 6.5; firmness,

16.6; free aqueous liquid, 36.0; free oil, 4.0; red colour, 7.1; and yellow colour, 5.4. The salmon canner, in this instance, was of the opinion that the salmon represented by the samples was of the best quality but wished to check his estimate.

Table VI shows the suggested grading limits for grading British Columbia canned sockeye salmon listed in table VI of the aforementioned bulletin. Comparison of the preceding averages with the limits given in the table shows that this salmon appears high in the respective grade 1 intervals as regards firmness, red colour and yellow colour, but falls in the grade 2 intervals of the characteristics free oil and free aqueous liquid, with the free oil high in the grade 2 interval. The sample size, unfortunately, on which the averages are based is only four, so that the average values of the five quality characteristics will be subject to appreciable sampling fluctuations. In general, however, the results would indicate that these samples represent very superior quality sockeye salmon.

An illustration of a more general method of applying numerical data in the evaluation of quality of canned salmon is afforded by the results of a private examination carried out by the inspection laboratory on samples of fresh water salmon caught in a lake north of Winnipeg and packed by a Winnipeg canning company. Here, again, unfortunately, the sample size was only four. The averages of the readings on the four samples were: softness (depth of penetration in millimetres), 13.5; pH of liquor, 6.21; volume of free aqueous liquid, 55.7 c.c.; volume of free oil, 3.0 c.c.; red colour, 2.8 units; yellow colour, 2.8 units; and refractive index of oil, 1.4752. Flavour and texture of muscle tissue were estimated by the writer subjectively.

The quality of this salmon relative to that of British Columbia canned salmon was accordingly as follows:—

- (1) Red and yellow colours: Similar to that of the best quality chum salmon.
- (2) Free oil: Slightly less in quantity than that of pink and coho salmon but about 3 times that of chum salmon.
- (3) Firmness: Poorer than that of the various British Columbia species excepting spring salmon.
- (4) Texture: The flesh tissue resembles that of chum salmon consisting of quite large attractive flakes.
- (5) Flavour: Very pleasing. Similar to, but somewhat better than, that of best quality chum salmon.
- (6) Refractive index of oil: Closer to that of sockeye (about 1.4751) than to the refractive indices of the oils of other British Columbia salmon.
- (7) pH of aqueous liquid: Possibly slightly lower than the values of this characteristic in British Columbia salmon.

PRELIMINARY WORK ON CANNED HERRING

The samples used in this investigation were packed at a Fraser River cannery during the 1939-40 season in an interval extending from about the middle of October, 1939, to the middle of February, 1940. When classified as to time of packing, the samples fell into five separate groups, each centered approximately at the middle of the month. One group, however (October 14), consisted of only one tin so that the period over which the data were reasonably reliable covered only the four months, November to February inclusive.

Of the different characteristics investigated, the volume of free oil, the volume of free aqueous liquid, the softness (or firmness) and the index of refraction of the dry oil were, apparently, the most suitable for the routine determination of the quality of canned herring, when the sample has been passed as regards freshness.

The mean weight of an empty oval herring tin calculated from the 43 tins examined was found to be 3.72 ounces with a standard deviation of 0.065 ounces. There is thus considerable fluctuation in the weights of the empty herring cans.

The average net weight of the contents of the can calculated from these results was 15.24 ounces with a standard deviation of 0.97 ounces. Once in twenty times in the long run, therefore, we may expect to obtain a can having a net weight as low as 13.3 ounces or a net weight as high as 17.2 ounces.

Generally speaking, the vacuum in these samples was poor, the greater proportion, namely, 25 out of 42 of the samples having zero vacuum or positive pressure.

The number of fish per can in these samples varied from five to nine, the mean number of fish per can being 7.4 with a standard deviation of 0.82.

A disappointing feature of the data on colour was the apparent lack of seasonal variation in these characteristics of canned herring, since the intensities of the red and yellow colours of the muscle tissue, determined by means of the Armstrong colorimeter after the samples had been rinsed with water to free them from tomato sauce, showed no evidence of trends in these characteristics. These characteristics, therefore, would not appear to be of any value for inspection purposes.

In contrast with the colour data the characteristics free oil, free aqueous liquid, firmness and refractive index of the dry oil all showed evidence of definite seasonal variations. Table VII gives the trends in the averages of free oil and free aqueous liquid in the samples packed over the four months, November to February inclusive, while table VIII shows the corresponding trends in firmness and refractive index of the dry oil of these samples. The standard deviations in the average free oil and free aqueous liquid around the lines of trend in samples of eight fish were, respectively, 0.236 and 0.835 c.c. and the standard deviations of firmness in averages of 3 and of refractive index were 1.26 and 0.000362.

Accordingly, application of the formula given above for calculating the standard deviation of the difference between two means gives 0.1242, 0.1244 and 0.0996 as the standard deviations of the differences in average free oil between intervals I and II, II and III, and III and IV respectively. Similarly, the standard deviations of the differences in average free aqueous liquid between these intervals are 0.4394, 0.4402 and 0.3522 respectively. Comparison of the differences in the averages between adjacent intervals with twice the standard deviation in the difference thus shows that the difference in the average free oil between intervals I and II is significant but that the differences in the remaining pairs of intervals are not significant. In the same way, it is found that the difference in the average free aqueous liquid in intervals I and II is significant, as is the difference between intervals III and IV, while the difference in average free aqueous liquid between intervals II and III is not significant.

Tests of significance of the differences in average firmness and average refractive index give analogous results. The differences in firmness between intervals I and II and intervals III and IV are definitely significant while that between intervals II and III is not significant. On the other hand, the differences in refractive index between intervals I and II and II and III are significant, but that between intervals III and IV is not significant.

Owing to the relatively low sample sizes available in the different intervals, the preliminary data on the seasonal trends in these four characteristics of canned herring are thus not entirely conclusive, but there seems no doubt that there are definite seasonal variations in several easily measured quality characteristics of this product.

OTHER PROBLEMS

During the past season further work has been done on certain other problems relating to the inspection of canned salmon. Owing to the pressing nature

of the salmon and herring investigations, however, the amount of time available for these problems has been very severely restricted. Only slight progress, therefore, has been made in the investigation on the nature and extent of the differences in the refractive index of the oils of the different species of salmon.

Similarly, only a small amount of time has been devoted to the problem of developing a rapid and accurate method of measuring acid values of salmon oils and, although considerable progress has been made in this investigation, it has not been possible to complete the work on this problem.

During the past season more time has been given than in previous years to the preparation of papers and bulletins reporting the results of investigations that have been brought to completion by the laboratory, and it is expected that in future still further emphasis will have to be placed on this phase of the work if the numerous results accumulated at the laboratory are to be made fully available to the industry. For example, additional papers reporting the results of the firmness investigation have been prepared for publication. Also, a paper has been prepared on the use of the pH of the aqueous liquid in the measurement of freshness of fish muscle tissue, a bulletin on the evaluation of quality of British Columbia canned salmon, and a paper on the investigation mentioned in last year's report dealing with the distribution of the red and yellow colours of the muscle tissue of canned spring salmon.

A pressing problem at the present time is to make available to the industry the results on seasonal trends and other variations in the quality of British Columbia canned salmon over the four years for which the data are now complete, namely, the 1936, 1937, 1938 and 1939 seasons. Work on this problem is well advanced and it is hoped that before the commencement of the 1941 season these results will be ready for publication either in a series of papers or in a bulletin. This work, together with a further investigation of the variations in quality of British Columbia canned herring, it is expected, will leave very little time in 1941 for other problems.

TABLE I.—SEASONAL VARIATION IN FIRMNESS OF SAMPLES OF SOCKEYE SALMON PACKED DURING 1938 IN THE SOUTHERN AND NORTHERN AREAS.

SOUTHERN AREA

T.....	2	3	4	5	6	7	8	9	10	11	12
N.....	1	—	6	24	8	8	26	22	16	17	28
\bar{X}	15.3	—	10.9	11.2	15.3	11.5	11.4	15.2	13.9	11.2	12.8
T.....	13	14	15	16	17	18	19	20	21	22	23
N.....	36	26	23	6	30	79	156	232	162	521	26
\bar{X}	15.0	12.4	13.1	14.9	13.8	12.4	13.8	12.1	11.5	12.4	10.5
T.....	24	25	26	27	28	29	30	31	32	33	34
N.....	—	—	—	208	143	54	18	13	9	—	5
\bar{X}	—	—	—	9.7	8.8	7.8	7.4	7.3	7.3	—	4.5

NORTHERN AREA

T.....	7	8	9	10	11	12	13	14	15	16	17
N.....	50	56	118	76	82	128	104	115	128	99	122
\bar{X}	15.9	15.5	16.1	15.0	15.6	15.7	15.6	14.6	15.3	15.2	14.9
T.....	18	19	20	21	22	23	24	25	—	—	—
N.....	81	45	62	24	19	12	15	1	—	—	—
\bar{X}	14.9	14.3	14.2	15.0	15.0	12.7	16.9	8.8	—	—	—

T = time interval; N = sample size; \bar{X} = average firmness.

TABLE II.—SEASONAL VARIATION IN THE RED AND YELLOW COLOURS OF THE MUSCLE TISSUE IN SAMPLES OF SOCKEYE SALMON PACKED DURING 1938 IN THE SOUTHERN AND NORTHERN AREAS.

SOUTHERN AREA

T.....	0	1	2	3	4	5	6	7	8	9	10	11	12
N.....	2	12	3	6	19	34	4	21	35	35	27	60	75
\bar{X}_R	5.2	5.4	5.5	5.2	6.0	6.5	6.1	6.0	6.2	6.2	6.4	6.4	6.4
\bar{X}_Y	2.5	2.8	3.2	3.0	3.9	4.5	4.1	3.5	4.0	4.4	4.6	4.5	4.5
T.....	13	14	15	16	17	18	19	20	21	22	23	24	25
N.....	59	51	37	63	95	99	145	145	99	266	28	2	2
\bar{X}_R	6.5	6.4	6.7	6.6	6.4	6.2	6.3	6.3	6.3	6.5	6.3	7.0	6.5
\bar{X}_Y	4.3	4.3	4.6	4.7	4.3	4.1	4.3	4.3	4.1	4.3	4.2	4.0	4.2
T.....	26	27	28	29	30	31	32	33	34	—	—	—	—
N.....	1	109	72	28	10	6	4	1	1	—	—	—	—
\bar{X}_R	7.0	6.0	5.7	5.4	4.4	3.7	4.0	6.0	4.0	—	—	—	—
\bar{X}_Y	5.5	3.8	3.8	3.7	3.4	3.1	3.4	4.5	3.0	—	—	—	—

NORTHERN AREA

T.....	7	8	9	10	11	12	13	14	15	16	17	18	19
N.....	26	31	57	38	49	70	52	63	61	54	69	41	27
\bar{X}_R	5.8	5.5	5.7	5.9	6.0	6.0	6.1	6.2	6.1	5.9	6.0	5.6	5.9
\bar{X}_Y	4.4	4.0	4.0	4.2	4.2	4.3	4.4	4.4	4.3	4.3	4.3	4.0	4.2
T.....	20	21	22	23	24	—	—	—	—	—	—	—	—
N.....	36	18	9	9	9	—	—	—	—	—	—	—	—
\bar{X}_R	5.9	5.7	5.2	6.3	5.6	—	—	—	—	—	—	—	—
\bar{X}_Y	3.9	4.0	3.5	4.7	3.9	—	—	—	—	—	—	—	—

T = time interval; N = sample size; \bar{X}_R = average red colour; \bar{X}_Y = average yellow colour.

TABLE III.—SEASONAL VARIATION IN THE FREE OIL OF SAMPLES OF SOCKEYE SALMON PACKED DURING 1938 IN THE SOUTHERN AND NORTHERN AREAS.

SOUTHERN AREA

T.....	1	2	3	4	5	6	7	8	9	10
N.....	1	1	1	2	4	1	2	4	3	—
\bar{X}	19.9	39.8	19.9	25.8	24.8	15.0	26.8	31.8	49.7	—
T.....	11	12	13	14	15	16	17	18	19	20
N.....	6	8	6	5	6	4	12	13	18	17
\bar{X}	47.1	34.6	37.8	38.6	52.3	50.7	66.3	62.4	59.8	52.5
T.....	21	22	23	24	25	26	27	28	29	—
N.....	14	38	1	—	—	—	14	12	7	—
\bar{X}	50.9	42.4	10.0	—	—	—	16.8	12.8	7.4	—

NORTHERN AREA

T.....	7	8	9	10	11	12	13	14	15	16
N.....	3	2	4	4	1	5	4	4	7	4
\bar{X}	50.1	30.0	53.9	52.0	50.2	37.5	51.2	36.2	29.3	31.3
T.....	17	18	19	20	21	22	23	24	—	—
N.....	6	3	1	1	—	1	—	1	—	—
\bar{X}	25.4	25.0	40.0	25.0	—	7.5	—	20.0	—	—

T = time interval; N = sample size (number of samples of 12 tins); \bar{X} = total free oil in 12- $\frac{1}{2}$ -lb. flat tins.

TABLE IV.—SEASONAL VARIATION IN THE FREE AQUEOUS LIQUID OF SAMPLES OF SOCKEYE SALMON PACKED DURING 1938 IN THE SOUTHERN AND NORTHERN AREAS.

SOUTHERN AREA

T.....	1	2	3	4	5	6	7	8	9	10
N.....	2	1	1	2	4	1	2	4	3	1
\bar{X}	310	340	380	365	372	435	395	361	407	400
T.....	11	12	13	14	15	16	17	18	19	20
N.....	6	8	6	5	6	4	12	13	18	17
\bar{X}	420	411	396	348	320	315	354	351	351	374
T.....	21	22	23	24	25	26	27	28	—	—
N.....	14	38	1	—	—	—	14	12	—	—
\bar{X}	382	393	300	—	—	—	518	554	—	—

NORTHERN AREA

T.....	7	8	9	10	11	12	13	14	15	16
N.....	3	2	4	4	1	5	4	4	7	4
\bar{X}	440	400	428	434	415	393	394	386	395	398
T.....	17	18	19	20	21	22	23	24	—	—
N.....	6	3	1	1	—	1	—	1	—	—
\bar{X}	435	435	400	420	—	452	—	335	—	—

T = time interval; N = sample size (number of samples of 12 tins); \bar{X} = total free aqueous liquid in 12- $\frac{1}{2}$ -lb. flat tins.

TABLE V.—STANDARD DEVIATIONS OF THE FOUR MAIN COMMERCIAL QUALITY CHARACTERISTICS OF CANNED SOCKEYE SALMON AROUND THE LINES OF SEASONAL TREND

Firmness	Red Colour	Yellow Colour	Free oil per $\frac{1}{2}$ lb. flat can (average of 12)
2.5	0.75	0.65	1.23

TABLE VI.—SUGGESTED GRADING LIMITS FOR GRADING BRITISH COLUMBIA CANNED SOCKEYE SALMON

Characteristic	Grade 1	Grade 2	Grade 3
Firmness.....	14.9 or greater	10.9 to 14.8	10.8 or less
Red Colour.....	5.96 or greater	4.82 to 5.95	4.81 or less
Yellow Colour.....	4.34 or greater	3.59 to 4.33	3.58 or less
Free Oil per $\frac{1}{2}$ lb. flat can.....	4.87 or greater	2.65 to 4.86	2.64 or less
Free Aqueous Liquid per $\frac{1}{2}$ lb. flat can.....	30.5 or less	30.6 to 40.2	40.3 or greater

TABLE VII.—SEASONAL TRENDS IN FREE OIL AND FREE AQUEOUS LIQUID IN SAMPLES OF CANNED HERRING PACKED DURING THE 1939-40 SEASON

Interval No.	I (Nov. 15 & 16)	II (Dec. 12 & 13)	III (Jan. 16 & 17)	IV (Feb. 12 & 13)
Total No. of Fish.....	88	43	87	93
Free Oil per Fish (c.c.).....	1.295	0.721	0.644	0.634
Free Liquor per Fish (c.c.).....	3.045	3.977	3.908	4.699
Total Weight of Fish (oz.).....	179.6	92.9	184.3	183.5
Free Oil per oz. (c.c.).....	0.635	0.333	0.304	0.322
Free Liquor per oz. (c.c.).....	1.492	1.839	1.845	2.382

TABLE VIII.—SEASONAL TRENDS IN FIRMNESS (100/s) AND REFRACTIVE INDEX OF FREE OIL IN SAMPLES OF CANNED HERRING PACKED DURING THE 1939-40 SEASON

Interval No.....	I	II	III	IV
Number of cans.....	12	6	12	12
Average firmness.....	6.31	8.25	7.66	9.81
Average refractive index.....	1.47291	1.47243	1.47129	1.47114

Standard deviation: firmness (average of 3 readings), 1.26; refractive index, 0.000362.

FIGURE 1

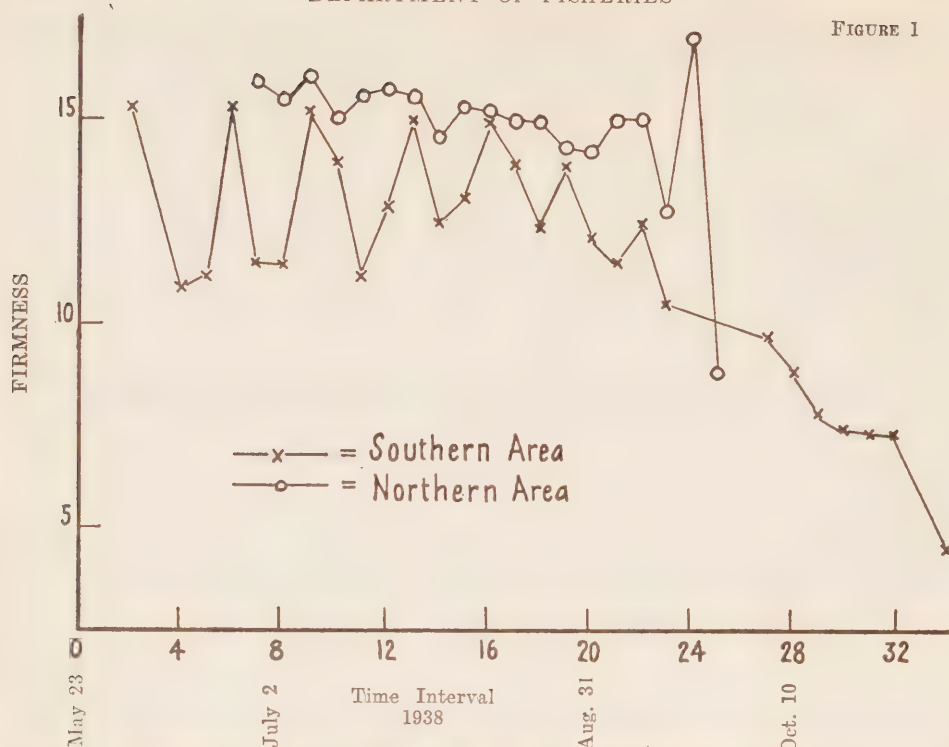


Figure 1.—Seasonal trends in firmness of samples of canned sockeye salmon packed during 1938.

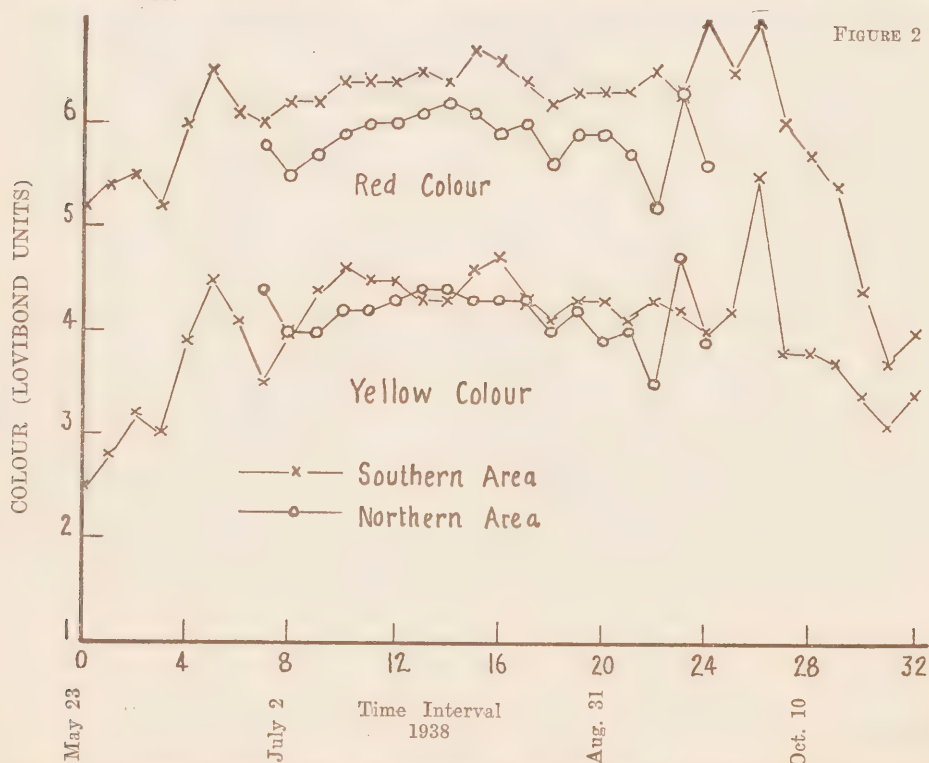


Figure 2.—Seasonal trends in the intensities of the red and yellow colours of the muscle tissue of samples of canned sockeye salmon packed during 1938.

FIGURE 3

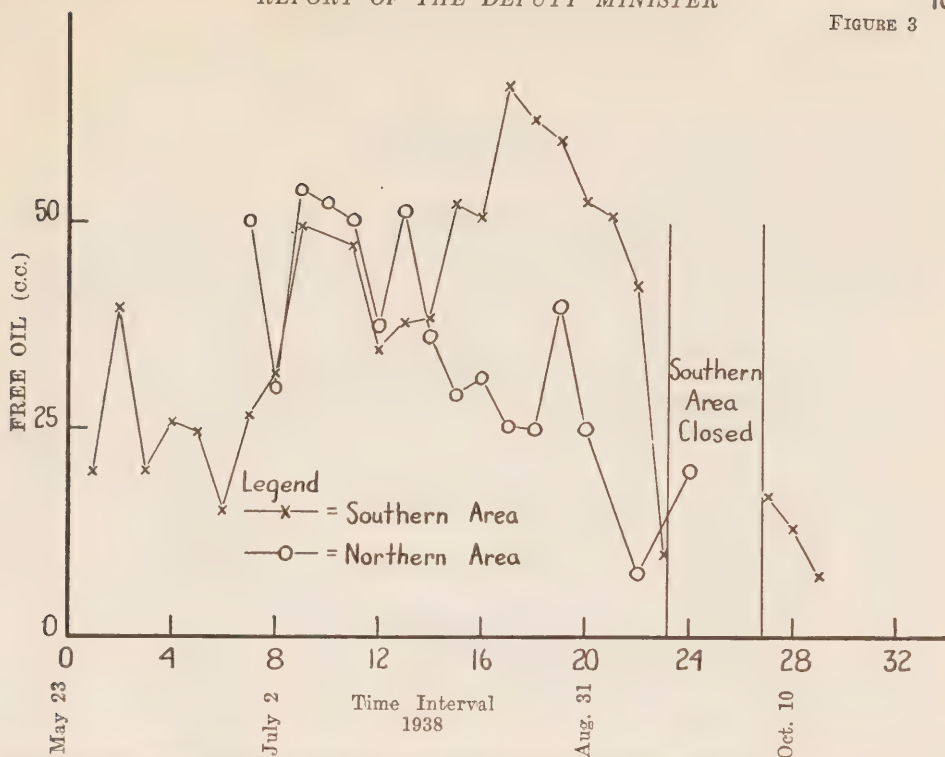


Figure 3.—Seasonal trends in free oil of samples of canned sockeye salmon packed during 1938.

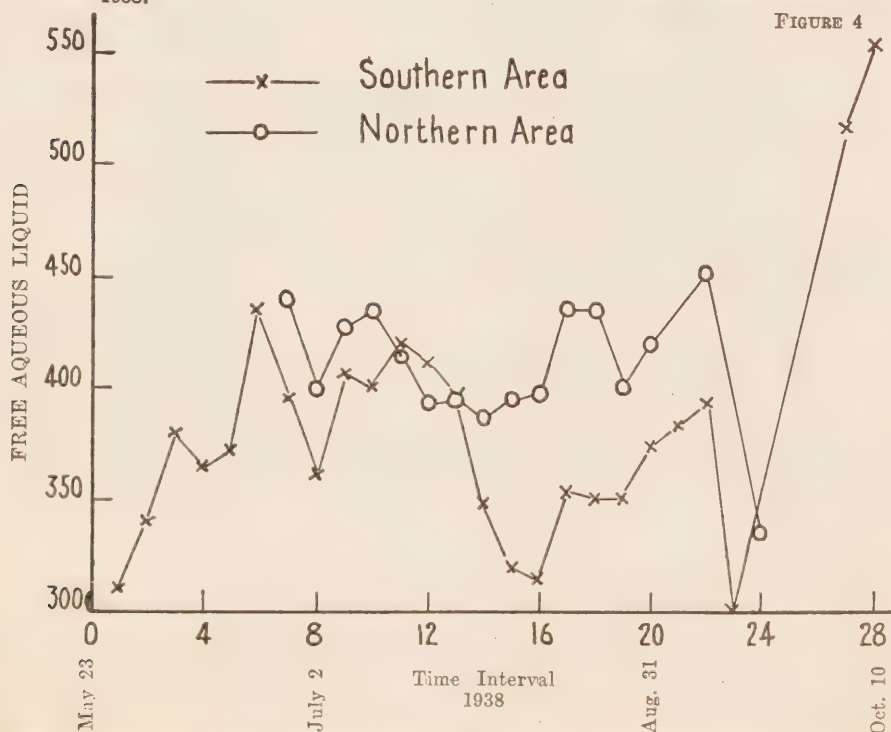


Figure 4.—Seasonal trends in free aqueous liquid of samples of canned sockeye salmon packed during 1938.

APPENDIX No. 6

FINANCIAL STATEMENT DEPARTMENT OF FISHERIES 1940-41

Vote No.	Appropriation	Amount	Expenditure
		\$ cts.	\$ cts.
ORDINARY EXPENDITURE			
78	(Salaries and Disbursements of Fisheries Officers and Guardians.....)	767,000 00	479,631 99
	Fisheries Patrol Service.....		204,962 55
	Fisheries Protection Service.....		17,374 13
79	Building Fishways and Clearing Rivers.....	2,000 00	701,968 67
80	Development of the Deep Sea Fisheries and the Demand for Fish.....		1,393 61
81	Salt Fish Board (Administration).....	60,000 00	47,534 05
82	Fish Culture.....	28,000 00	16,415 23
83	Oyster Culture.....	195,000 00	170,648 97
84	Fisheries Research Board of Canada.....	24,000 00	20,561 89
85	International Fisheries Commission (Halibut).....	243,700 00	227,519 51
86	International Pacific Salmon Fisheries Commission.....	25,000 00	24,718 57
87	Board of Enquiry re Great Lakes Fisheries.....	40,000 00	34,622 84
88	Expenses re Pelagic Seal Skins.....	3,000 00	1,347 37
89	Grant to United Maritime Fishermen's Association.....	135,000 00	75,016 82
Statutory	Civil Service Gratuities.....	3,000 00	3,000 00
Statutory	Fishing Bounty.....	700 00	700 00
		159,920 40	159,920 40
77	Departmental Administration.....	1,686,320 40	1,485,367 93
Statutory	Minister's Salary and Car Allowance.....	129,300 00	120,480 89
		12,000 00	12,000 00
		1,827,620 40	1,617,848 82
SPECIAL EXPENDITURE			
90	To provide for the extension of educational work in co-operative producing and selling among fishermen....	50,000 00	44,939 12
91	To provide for assisting the Salt Fish Branch of the Fishing Industry.....	400,000 00	342,569 61
SPECIAL WAR EXPENDITURES			
Statutory	War Appropriation Act, 1940—		
	Canned Lobster Control.....	174,400 00	173,727 57
	Wartime Fisheries Advisory Board.....	3,000 00	584 05
		2,455,020 40	2,179,669 17
*	(Pacific Halibut Treaty Special Account (Finance Dept.).....)		18,460 13
	(Pacific Salmon Treaty Special Account (Finance Dept.).....)		28,780 16
			2,226,909 46

* Balance due by the United States Government on account of divisible expenditure for the fiscal year 1940-41.

STATEMENT OF REVENUE RECEIVED DURING THE FISCAL YEAR 1940-41

Class	Total	General Account	Nova Scotia	P.E.I.	N.B.	Quebec	Ontario	B.C.	Yukon	N.W.T.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
ORDINARY										
Fisheries Revenue.....	51,880 43		8,569 50	2,849 99	8,712 75	187 25	6 00	31,009 94	490 00	55 00
Fines and Forfeitures.....	10,424 11		360 35	155 00	473 49			9,433 27	2 00	
Casual Revenue.....	8,235 59	554 93	685 35	5,571 11	240 65	119 34		1,064 21		
Fish Culture Revenue.....	294 00		30 00	39 00	225 00					
Modus Vivendi.....	276 00		63 00					213 00		
Pelagic Sealing.....	160,810 77	160,810 77								
Premium, Discount and Exchange.....	5 50		4 40					1 10		
	231,926 40	161,365 70	9,712 60	3,615 10	9,651 89	306 59	6 00	41,721 52	492 00	55 00
SPECIAL RECEIPTS (WAR)										
Sales of Canned Lobster.....	97,137 02	68,928 05	692 18		1,611,19	3,892 08	22,013 52			
	329,063 42	230,293 75	10,404 78	3,615 10	11,263 08	4,198 67	22,019 52	41,721 52	492 00	55 00
Refund of fees received prior to 1940-41										
Fisheries Rev. N.B....	1 00									
B.C....	2 00									
	329,060 42									

SALARIES AND DISBURSEMENTS OF FISHERY OFFICERS AND GUARDIANS

EXPENDITURES AND SUMMARY 1940-41

NOVA SCOTIA—

Head Office	\$ 23,897 92
District No. 1	35,679 11
District No. 2	50,293 17
District No. 3	50,574 20
	<u>\$ 160,444 40</u>

PRINCE EDWARD ISLAND—

District No. 1	29,064 93
District No. 2 (Magdalen Islands, Que.)	6,345 65
	<u>35,410 58</u>

NEW BRUNSWICK—

District No. 1	23,936 05
District No. 2	56,452 63
District No. 3	28,999 89
	<u>109,388 57</u>

General—East 9,880 31

BRITISH COLUMBIA—

Head Office	28,622 08
District No. 1	31,592 63
District No. 2	39,962 05
District No. 3	45,521 67
Salmon Trap Net Commission	1,189 82
Canned Salmon Inspection Office	11,636 44
	<u>158,524 69</u>

General—West 5,983 44
\$ 479,631 99

SUMMARY

Nova Scotia.....	\$165,728 94
Prince Edward Island	30,181 95
New Brunswick	112,867 32
Quebec	6,345 65
British Columbia	164,508 13
	<u>\$ 479,631 99</u>

DEPARTMENT OF FISHERIES

FISHERIES PATROL SERVICE

EXPENDITURES AND SUMMARY 1940-41

NOVA SCOTIA—

District No. 1—

Chartered Boats	\$	934	18
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District No. 2—

Departmental Boats	\$	12,143	35
Chartered Boats		2,191	85
General Account		9	96
		14,345	16

District No. 3—

Departmental Boats		10,550	33
Chartered Boats		1,080	00
		11,630	33

26,909 67

PRINCE EDWARD ISLAND—

Departmental Boats		2,642	50
Chartered Boats		7,117	70
General Account		6	00
		9,766	20

NEW BRUNSWICK—

District No. 1—

Departmental Boats		11,456	50
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District No. 2—

Chartered Boats		13,594	61
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25,051 11

General—East		3,438	26
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BRITISH COLUMBIA—

District No. 1—

Departmental Boats		18,773	32
Chartered Boats		932	09
General Account		121	73
		19,827	14

District No. 2—

Departmental Boats		33,635	02
Speed Boats		184	13
Chartered Boats		29,597	32
		63,416	47

District No. 3—

Departmental Boats		22,557	98
Chartered Boats		25,705	87
		48,263	85

General—West		15	00
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Digby Island		5,731	16
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Poplar Island		2,543	69
		139,797	31

\$	204,962	55
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SUMMARY

Nova Scotia	\$	26,909	67
Prince Edward Island		13,204	46
New Brunswick		25,051	11
British Columbia		139,797	31
	\$	204,962	55

FISHERIES PROTECTION SERVICE

EXPENDITURE SUMMARY—1940-41

West Coast	\$	17,374	13
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FISH CULTURE

EXPENDITURE AND SUMMARY, 1940-41

GENERAL—

Administration	\$	13,163	42
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NOVA SCOTIA—

Antigonish Hatchery	\$	17,515	52
Bedford Hatchery		5,146	37
Cobequid Hatchery		9,001	68
Colbrook Pond		3,034	63
Grand Lake Pond		6,402	33
Kejimikujik Pond		3,634	92
Lindloff Hatchery		5,543	51
Margaree Hatchery		12,203	09
Margaree Pond		1,524	70
Mersey River Pond		796	24
Middleton Hatchery		6,794	76
Nictaux Pond		1	00
River Philip Pond		827	75
Sackville Pond		267	16
Yarmouth Hatchery		5,923	52
			78,617 18

PRINCE EDWARD ISLAND—

Cardigan Pond		3,173	48
Kelly's Pond		6,621	18
Morrell Pond		516	86
			10,311 52

NEW BRUNSWICK—

Charlo Hatchery		8,067	81
Florenceville Hatchery		9,412	76
Grand Falls Hatchery		5,678	92
Miramichi Hatchery		6,051	66
Miramichi Pond		3,590	68
New Mills Pond		4,645	73
Saint John Hatchery		9,127	18
Saint John Pond		3,527	55
			50,102 29

GENERAL ACCOUNT—EAST—

Chamcook Lakes, N.B.		153	78
Miscellaneous		4,330	36
Supervisors, Engineers and Staff		13,232	21
			17,716 35

BRITISH COLUMBIA—

General Account		738	21
			\$ 170,648 97

SUMMARY

General Account		13,163	42
Nova Scotia		88,543	85
Prince Edward Island		11,584	17
New Brunswick		56,619	32
British Columbia		738	21
			\$ 170,648 97

DEVELOPMENT OF THE DEEP SEA FISHERIES AND THE DEMAND FOR FISH

EXPENDITURE 1940-41

Aids in expanding demands for fish.....	\$ 16,672 08
Educational Work.....	9,117 29
Miscellaneous.....	2,590 64
Subsidy Bait Collection Service.....	6,072 62
Fisheries Intelligence Bureau.....	1,252 30
Advertising.....	2,830 60
Shrimp Fishing Experiment.....	21 60
Destruction of Sea Lions.....	32 51
Fish Collection Service.....	3,944 41
General—East.....	5,000 00
	<hr/> \$ 47,534 05

FISHERIES RESEARCH BOARD OF CANADA

EXPENDITURE 1940-41

	Expenditures			
	From Vote		From Revenues	Total
	\$	cts.	\$	cts.
Atlantic Biological Station—St. Andrews, N.B.....	54,478	21	375 00	54,853 21
Pacific Biological Station—Nanaimo, B.C.....	60,081	45		60,081 45
Atlantic Experimental Station—Halifax, N.S.....	38,319	95		38,319 95
Gaspé Experimental Station—Grand River, Que.....	15,014	41	650 00	15,664 41
Pacific Experimental Station—Prince Rupert, B.C.....	38,480	17		38,480 17
Administration and General Fund—				
Toronto Office (A. G. Huntsman).....	\$ 8,425	60		
General.....	6,264	03	1,666 34	
Atlantic Salmon Investigation.....	3,023	06		
Publications.....	3,432	63		
	21,145	32		22,811 66
	227,519	51	2,691 34	230,210 85

FISHERIES EXPENDITURES 1940-41 BY PROVINCES

Appropriation	General	Nova Scotia	Prince Edward Island	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Salaries and Disbursements of Fishery Officers and Guardians.....		165,728 94	30,181 95	112,867 32	6,345 65					164,508 13	479,681 99
Fisheries Patrol Service.....		26,909 67	13,204 46	25,051 11						139,797 51	204,962 55
Fisheries Protection Service.....										17,374 13	17,374 13
Building Fishways and Clearing Rivers.....										1,393 61	1,393 61
Development of the Deep Sea Fisheries and the Demand for Fish.....		152 70									
Salt Fish Board (Administration).....	7,315 32	15,681 03	2,181 62	8,435 97	4,852 22	5,168 96	173 43		252 50	3,473 00	47,584 05
Fish Culture.....	13,163 42	88,543 85	11,584 17	56,619 32						788 21	170,648 97
Oyster Culture.....	722 58	6,174 71	11,971 46	1,663 14						98,561 62	20,561 89
Fishery Research Board of Canada.....	18,122 26	41,343 01		54,475 21	15,014 41					24,718 57	247,519 51
International Fisheries Commission (Halibut).....											
International Pacific Salmon Fisheries Commission.....											
Board of Inquiry re Great Lakes Fisheries.....	1,347 37									34,622 84	34,622 84
Duties, etc., re Pelagic Seal Skins.....	75,016 82									1,347 37	1,347 37
Grant to United Maritime Fishermen's Association.....										75,016 82	75,016 82
Fishing Bounty.....		1,000 00	1,000 00	1,000 00							3,000 00
Extension of Educational Work in co-operative producing and selling among fishermen.....		81,105 00	10,058 90	20,002 30	48,754 20						159,920 40
Assisting the Salt Fish Branch of the Fishing Industry.....		16,560 05	3,342 25	12,604 40	7,723 97					4,708 45	44,939 12
Miscellaneous Civil Service Gratuities.....	3,160 00	173,477 91	11,498 57	35,429 56	119,003 57						342,569 61
War Appropriation Act, 1940—		400 00		300 00							700 00
Canned Lobster Control Scheme.....											
War-time Fisheries Advisory Board.....	584 05	78,293 78	5,686 50	26,930 29	8,264 18	54,552 82					173,727 57
											584 05
Departmental Administration.....	119,431 82	711,785 88	100,709 88	355,411 62	209,958 20	59,721 78	173 43		252 50	489,743 17	2,047,188 28
Minister of Fisheries—Salary and Car Allowance.....											130,480 89
											12,000 00
*Special Account Halibut (Finance Dept.).....											18,460 13
*Special Account Salmon (Finance Dept.).....											28,780 16
											2,236,909 46

NOTE.—(*) Balance due by the United States Government on divisible expenses at the close of the fiscal year 1940-41.

DEPARTMENT OF FISHERIES

STATEMENT SHOWING THE ANNUAL EXPENDITURE OF THE DOMINION GOVERNMENT ON
ACCOUNT OF FISHERIES SERVICE SINCE CONFEDERATION

Year	Fish Inspection, etc.	Fish Culture	Fisheries Research Board	Dev. D.S. Fish, etc.	Fishing Bounty	Sundry Services	Total
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
To June 30, 1867..	27,043 97					9,763 40	36,807 37
1867-68..	32,752 48	800 89				7,550 51	41,103 88
1868-69..	32,809 60					192 24	33,001 84
1869-70..	74,163 43	3,074 47				58 00	77,295 90
1870-71..	77,388 84	4,375 32				80 02	81,844 18
1871-72..	87,777 45	4,826 24				721 49	93,325 18
1872-73..	90,517 28	7,360 92				4,400 00	102,278 20
1873-74..	61,940 98	14,306 13				12,040 13	88,287 24
1874-75..	48,584 95	17,999 73				3,190 97	69,775 65
1875-76..	76,128 35	32,055 38				16,193 13	124,376 86
1876-77..	72,527 25	24,037 73					96,564 98
1877-78..	73,173 48	20,088 80				95,118 30	188,380 58
1878-79..	62,430 32	19,888 75				12,389 05	94,708 12
1879-80..	57,052 94	29,109 61				500 00	86,662 55
1880-81..	109,579 91	21,530 62					131,110 53
1881-82..	89,097 62	31,244 29				2,433 33	122,775 24
1882-83..	92,820 25	25,776 87			172,285 47	28,418 63	319,301 22
1883-84..	94,166 32	31,289 38			130,344 85	26,301 82	282,102 37
1884-85..	107,537 35	43,879 82			155,718 98	41,613 50	348,749 65
1885-86..	118,914 51	38,660 19			161,539 39	71,744 64	390,858 73
1886-87..	224,133 17	37,821 96			160,903 59	22,902 77	445,761 49
1887-88..	190,255 40	41,082 04			163,757 92	50,405 09	445,500 45
1888-89..	161,632 07	38,743 24		103 20	150,185 53	32,177 58	378,241 62
1889-90..	137,192 33	38,278 96		2,266 74	158,526 54	32,218 72	366,414 37
1890-91..	160,269 18	43,023 81		1,548 89	158,241 01	26,521 66	389,604 55
1891-92..	171,066 94	42,967 94		2,266 74	156,891 85	32,900 20	406,092 92
1892-93..	191,289 71	47,339 04		1,791 47	159,752 14	83,163 60	483,335 96
1893-94..	208,068 38	45,024 67		2,624 73	158,794 54	83,961 92	498,474 24
1894-95..	207,476 76	39,720 76		2,648 63	160,089 42	34,482 88	444,418 45
1895-96..	211,466 14	38,095 96		3,053 63	163,567 99	13,403 21	429,586 93
1896-97..	215,063 64	27,330 73		2,925 82	154,389 77	43,876 89	443,586 85
1897-98..	200,493 77	28,002 32		2,305 73	157,504 00	53,514 83	441,820 65
1898-99..	203,356 36	34,522 57	4,709 10	2,936 20	159,459 00	12,093 75	417,076 98
1899-1900..	185,813 31	39,370 12	739 61	13,263 99	160,000 00	45,654 69	444,841 72
1900-01..	239,441 08	68,961 40	1,990 58	15,160 83	158,802 50	9,984 96	494,341 35
1901-02..	265,185 22	79,891 85	3,481 00	14,820 41	155,942 00	32,178 33	551,498 81
1902-03..	268,595 61	77,330 86	3,495 95	13,991 93	159,853 50	9,851 10	531,118 95
1903-04..	314,335 70	109,287 07	4,496 54	27,385 08	158,943 70	22,867 46	637,315 55
1904-05..	571,787 63	149,419 24	2,825 50	51,723 32	157,228 24	49,148 98	982,132 91
1905-06..	409,573 74	209,376 28	5,024 42	87,479 71	158,546 65	107,388 32	977,389 12
1906-07..	303,620 12	118,681 62	2,596 84	50,312 38	159,015 75	60,995 98	695,222 69
1907-08..	404,868 55	244,459 96	15,829 30	47,852 71	156,114 50	123,574 80	992,699 82
1908-09..	464,031 87	190,563 19	21,599 70	40,167 36	159,999 90	126,966 50	1,003,328 52
1909-10..	689,557 42	180,545 65	14,386 79	55,935 64	155,221 85	101,486 31	1,197,133 66
1910-11..	456,693 79	220,727 66	9,700 43	62,006 44	159,166 75	320,778 96	1,229,074 03
1911-12..	531,900 64	235,699 52	16,997 44	67,870 64	159,999 70	120,614 83	1,213,082 77
1912-13..	661,326 46	283,793 43	21,000 00	66,475 19	159,996 40	66,409 90	1,259,001 38
1913-14..	1,072,688 45	354,675 13	16,972 47	91,822 18	158,661 25	185,081 52	1,879,896 00
1914-15..	767,379 35	370,093 17	20,994 69	72,937 23	159,584 14	223,923 88	1,614,912 46
1915-16..	618,439 44	275,079 38	24,649 33	77,631 98	158,741 05	156,708 67	1,311,299 85
1916-17..	548,130 30	275,166 53	26,018 15	81,366 60	159,999 80	81,851 38	1,172,532 76
1917-18..	612,624 42	270,796 95	25,508 72	102,591 73	159,675 25	95,236 18	1,266,651 10
1918-19..	566,450 40	255,761 60	23,294 62	101,129 01	135,136 70	43,895 64	1,150,206 52
1919-20..	945,401 82	328,533 33	27,729 74	76,354 09	159,449 80	71,516 79	1,604,672 47
1920-21..	1,227,664 78	422,761 60	26,973 13	16,893 28	152,519 30	83,036 34	1,929,848 43
1921-22..	1,074,455 10	390,966 47	43,806 34	19,948 63	159,449 80	177,660 30	1,866,286 64
1922-23..	839,536 66	353,625 51	44,618 54	13,056 01	157,172 55	178,202 17	1,536,211 44
1923-24..	838,628 64	369,376 79	46,966 09	20,822 49	159,016 80	175,498 93	1,611,209 74
1924-25..	794,499 76	357,006 64	46,649 29	30,233 21	159,826 40	152,879 14	1,541,094 44
1925-26..	791,865 76	342,636 72	105,440 58	5,291 83	159,984 80	160,399 85	1,565,819 54
1926-27..	820,341 66	257,645 44	123,455 26	6,459 31	159,768 10	179,130 24	1,546,800 41
1927-28..	913,004 77	353,360 62	137,732 52	42,300 78	158,375 80	259,319 99	1,894,094 48
1928-29..	955,126 65	434,471 58	191,941 45	96,517 66	151,411 20	262,594 14	2,092,062 68
1929-30..	1,163,349 00	361,165 09	285,956 53	111,034 51	159,749 53	279,555 56	2,360,810 04
1930-31..	1,176,613 73	322,586 01	386,383 83	189,678 94	159,773 55	286,647 00	2,632,833 06
1931-32..	970,669 66	271,159 98	275,665 97	102,025 64	159,432 30	290,115 49	2,069,069 04
1932-33..	858,612 55	231,035 78	228,062 63	84,766 31	159,780 65	260,716 37	1,642,517 29
1933-34..	842,672 48	205,934 00	176,239 67	54,191 84	159,311 35	159,520 01	1,597,869 35
1934-35..	874,067 81	211,021 99	178,745 09	63,068 59	159,976 25	155,634 07	1,642,513 80
1935-36..	916,763 86	231,036 57	194,872 26	39,128 15	159,966 20	172,246 05	1,714,013 09
1936-37..	885,973 76	214,528 63	198,435 60	48,030 43	159,977 75	530,368 15	1,937,314 32
1937-38..	934,243 13	218,055 35	233,614 91	50,065 27	159,857 25	588,990 78	2,154,826 69
1938-39..	1,107,126 66	233,408 21	242,296 68	54,059 29	159,982 70	773,989 37	2,570,862 91
1939-40..	891,436 91	224,918 62	240,651 04	56,466 41	159,993 85	1,452,260 92	3,025,728 05
1940-41..	701,968 67	170,648 97	230,210 85	47,534 05	159,920 07	872,077 57	2,182,360 51
	34,442,683 45	11,388,022 90	3,932,759 18	2,382,254 64	9,348,621 07	10,356,689 88	71,881,081 12

SUMMARY BY PROVINCES

General.....	\$ 5,901,029 87
Nova Scotia.....	19,679,779 21
Prince Edward Island.....	3,418,375 32
New Brunswick.....	10,149,693 12
Quebec.....	5,722,310 31
Ontario.....	4,147,660 20
Manitoba.....	1,814,104 79
Manitoba and North West Territories.....	24,771 76
North West Territories.....	71,242 18
Saskatchewan.....	579,406 88
Alberta.....	641,299 93
British Columbia.....	19,671,999 12
Yukon.....	29,358 43
	<u>\$71,851,031 12</u>

STATEMENT SHOWING THE REVENUE COLLECTED ANNUALLY BY THE DOMINION GOVERNMENT ON ACCOUNT OF THE FISHERIES SERVICE SINCE CONFEDERATION

Year	Fish. Rev. and Fines and Forf.	Casual Revenue	Pelagic Sealing Revenue	Sundry Revenues	Total
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
To June 30/67.....	10,490 90				10,490 90
1867-68.....	19,556 97				19,556 97
1868-69.....	13,583 97				13,583 97
1869-70.....	16,662 43				16,622 43
1870-71.....	12,408 97				12,408 97
1871-72.....	10,498 00				10,498 00
1872-73.....	10,338 24				10,338 24
1873-74.....	14,012 83				14,012 83
1874-75.....	14,764 20				14,764 20
1875-76.....	13,571 12				13,571 12
1876-77.....	13,364 85				13,364 85
1877-78.....	14,113 11				14,113 11
1878-79.....	17,738 34	(Halifax Fisheries Award)			17,738 34
1879-80.....	19,423 16			(4,490,882 64)	4,508,620 98
1880-81.....	24,596 94				24,596 94
1881-82.....	23,687 45				23,687 45
1882-83.....	21,337 16				21,337 16
1883-84.....	20,006 50				20,006 50
1884-85.....	26,627 86				26,627 86
1885-86.....	26,088 50				26,088 50
1886-87.....	25,947 53				25,947 53
1887-88.....	42,931 12	414 97		2,067 00	45,413 09
1888-89.....	46,087 96	712 29		10,338 30	57,138 55
1889-90.....	56,956 83	296 05		112,686 50	69,939 38
1890-91.....	60,917 19	273 72		9,877 23	71,068 14
1891-92.....	49,541 39	437 78		13,244 50	63,223 67
1892-93.....	95,892 36	233 67		50,303 29	146,429 32
1893-94.....	73,352 59			6,249 00	79,601 59
1894-95.....	89,150 42			8,162 78	97,313 20
1895-96.....	88,822 66			5,408 34	94,231 00
1896-97.....	98,884 40	2,000 00		7,585 15	108,469 55
1897-98.....	106,779 59			6,923 91	113,703 50
1898-99.....	76,440 10			34,992 36	111,432 46
1899-1900.....	79,788 99			8,607 60	88,396 59
1900-01.....	78,966 61			9,178 50	88,145 11
1901-02.....	67,945 93			13,769 94	81,715 87
1902-03.....	69,710 42			8,925 40	78,635 82
1903-04.....	85,591 03			10,165 50	95,756 53
1904-05.....	80,316 14			11,083 70	91,399 84
1905-06.....	83,441 53			14,568 16	98,009 69
1906-07.....	53,010 25			4,134 00	57,144 25
1907-08.....	80,116 98			93,119 28	173,236 26
1908-09.....	72,901 56			9,794 70	82,696 26
1909-10.....	74,193 78			10,876 78	85,070 56
1910-11.....	85,785 08			15,076 50	100,861 58
1911-12.....	82,445 01			13,785 00	96,230 01
1912-13.....	92,962 69		200,000 00	13,500 00	306,462 69
1913-14.....	99,266 13			11,728 50	110,994 63

DEPARTMENT OF FISHERIES

STATEMENT SHOWING THE REVENUE COLLECTED ANNUALLY BY THE DOMINION GOVERNMENT ON ACCOUNT OF THE FISHERIES SERVICE SINCE CONFEDERATION—*Concluded*

Year	Fish. Rev. and Fines and Forf.	Casual Revenue	Pelagic Sealing Revenue	Sundry Revenues	Total
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
1914-15.....	92,757 02		20,000 00	8,878 75	121,635 77
1915-16.....	98,629 67		10,000 00	5,680 50	114,310 17
1916-17.....	96,376 26		10,000 00	9,912 00	116,288 26
1917-18.....	114,572 39		12,620 36	9,523 60	136,716 35
1918-19.....	123,114 29		962 31	8,592 64	132,669 24
1919-20.....	336,590 99	65,849 64	3,501 60	6,925 33	412,867 56
1920-21.....	297,797 49	7,362 44	185,748 07	37,856 48	528,764 48
1921-22.....	224,156 50	5,451 20	86,080 62	13,212 42	328,900 74
1922-23.....	290,624 32	5,183 15	59,876 83	7,137 60	362,821 90
1923-24.....	173,747 98	3,333 54	35,659 43	8,115 98	220,856 93
1924-25.....	144,505 26	2,903 17	28,752 91	2,137 60	178,298 94
1925-26.....	175,638 99	3,997 34	74,858 96	10,050 68	264,545 97
1926-27.....	185,295 85	3,662 10	35,788 54	633 05	225,379 54
1927-28.....	130,566 95	8,877 09	95,014 07	396 80	234,854 91
1928-29.....	123,473 65	8,128 11	73,236 35	1,816 24	206,154 35
1929-30.....	124,471 29	9,978 85	62,507 32	607 45	197,564 91
1930-31.....	85,140 24	13,730 43	37,163 78	900 64	136,935 09
1931-32.....	47,248 04	12,322 90	44,471 94	1,894 06	105,936 94
1932-33.....	8,392 32	14,132 17	2,609 16	3,212 43	28,346 08
1933-34.....	52,134 18	26,039 22	52,466 26	1,941 98	132,581 64
1934-35.....	51,046 62	6,837 22	89,549 74	1,744 82	149,208 40
1935-36.....	48,859 07	4,681 69	113,594 61	727 23	167,862 60
1936-37.....	62,334 46	9,174 27	103,494 19	1,727 10	176,730 02
1937-38.....	68,065 25	6,075 50	45,282 51	420 60	119,823 86
1938-39.....	63,883 34	8,884 92	39,355 17	654 93	112,778 36
1939-40.....	65,433 10	8,413 09	74,025 84	715 32	148,587 36
1940-41.....	62,301 54	8,235 59	160,810 77	97,712 52	329,060 42
	5,787,534 83	247,622 11	1,757,411 34	5,149,693 32	12,942,261 60

SUMMARY BY PROVINCES

General Account.....	\$ 6,565,937 31
Nova Scotia.....	793,943 23
New Brunswick.....	704,099 60
Prince Edward Island.....	171,912 40
Quebec.....	352,658 64
Ontario.....	556,947 08
Manitoba.....	335,474 08
Manitoba and Northwest Territories.....	7,416 45
North West Territories.....	9,058 23
Hudson Bay District.....	1,187 98
Saskatchewan.....	95,152 41
Alberta.....	234,497 16
British Columbia.....	3,096,318 28
Yukon.....	17,658 75
	<u>\$12,942,261 60</u>

APPENDIX No. 7

COMPARATIVE STATEMENT OF LOBSTER FISHING LICENCES
1936-1940

(Figures for 1928-1935 will be found in Appendix No. 7 of the departmental report for 1939-1940.)

PRINCE EDWARD ISLAND AND MAGDALEN ISLANDS

Year	Magdalen Islands	Prince County	Kings County	Queens County	Kings and Queens (Southern portion)	Totals
1936.....	984	972	580	536	609	3,681
1937.....	973	1,060	594	417	538	3,632
1938.....	767	1,035	539	396	551	3,288
1939.....	644	1,038	532	375	546	3,135
1940.....	534	933	356	274	438	2,535

NOVA SCOTIA—DISTRICT No. 1

Year	Inverness County	Richmond County	Cape Breton County	Victoria County	Totals
1936.....	845	948	886	506	3,185
1937.....	796	1,028	784	473	3,081
1938.....	738	883	823	455	2,899
1939.....	697	962	741	429	2,829
1940.....	482	824	531	333	2,170

NOVA SCOTIA—DISTRICT No. 2

Year	Halifax Office	Halifax County	Patrol Boat	Guys-boro County	Antig-onish County	aPictou and Col- chester	aCum-berland County	bHants, Col- chester and Cum-berland County	Totals
1936....	1	1,460	.....	1,563	506	732	420	10	4,698
1937....	.....	1,429	.....	1,524	567	654	306	18	4,498
1938....	.....	1,345	.....	1,495	461	655	380	14	4,350
1939....	.....	1,459	1	1,421	411	590	323	18	4,223
1940....	1	1,176	.....	1,291	288	463	254	23	3,496

a Northumberland Straits side.

b Bay of Fundy side.

NOVA SCOTIA—DISTRICT No. 3

Year	Lunen-burg	Queens	Shel-burne	Yar-mouth	Digby	Kings	Anna-polis	Totals
1936.....	550	304	1,058	831	368	23	90	3,224
1937.....	692	398	1,190	972	384	37	113	3,786
1938.....	617	298	1,128	1,135	438	32	104	3,752
1939.....	689	314	1,232	1,323	470	43	159	4,230
1940.....	529	247	970	1,243	460	36	136	3,621

DEPARTMENT OF FISHERIES

NEW BRUNSWICK—DISTRICT No. 1

Year	Charlotte	Saint John	Albert and West-morland	Totals
1936.....	408	85	1	494
1937.....	380	81	2	463
1938.....	95	71	6	172
1939.....	323	46	11	380
1940.....	267	75	10	352

NEW BRUNSWICK—DISTRICT No. 2

Year	Northumberland County	Restigouche County	Gloucester County	Kent County	West-morland County	Totals
1936.....	503	73	1,091	1,033	619	3,269
1937.....	526	60	1,084	1,008	696	3,774
1938.....	523	54	1,084	1,015	708	3,384
1939.....	528	55	1,072	903	671	3,229
1940.....	464	42	803	727	503	2,539

NOTE.—Cancelled licences are not included in the figures in this appendix.

APPENDIX No. 8

The following is a statement of the various kinds of licences issued by the supervisors in their respective districts, during the 1940-41 season:

MAGDALEN ISLANDS, QUEBEC—Supervisor J. J. Larabee

Kind of Licences	Number of Licences Issued
Lobster fishing	534
Certificates of identification—Nil	
Licences to can lobsters	7
Certificates under section 53—1	
Herring seine	20
Herring trap-net	17 (2 cod trap-nets)
Smelt gill-net	67
Smelt bag-net or box-net	Nil
	<hr/> 645

PRINCE EDWARD ISLAND—Supervisor J. J. Larabee

Kind of Licences	Number of Licences Issued
Lobster fishing	2,002 (1 cancelled)
Certificates of identification—35	
Licences to can lobsters	49
Oyster fishery	20
Quahaug fishery	83
Certificates under section 53—3	
Cannery permits (fish or shellfish)	10
Trap-net fishing	1
Salmon trap-net or pound-net	3
Set salmon gill-net	8
Gaspereau gill-net permits	6
Special oyster permits	68
(contaminated areas)	
Certificates under section 24 of the regulations governing the inspection of canned fish and shellfish, etc., 850 (approx.).	
Scallop fishery	2
Smelt gill-net	207
Smelt bag-net or box-net	169
	<hr/> 2,628 (1 cancelled)

NOVA SCOTIA—DISTRICT No. 1—Supervisor Wm. McAulay

Kind of Licences	Number of Licences Issued
Lobster fishing	2,170
Certificates of identification—6	
Licences to can lobsters	17
Oyster fishery	96
Cannery permits (fish or shellfish)	5
Certificates under section 53—97	
Lobster pound	1
Trap-net fishing	42
Salmon trap-net, pound-net or weir	221 (1 cancelled)
Special angling permits	138
Set salmon gill-net	64
Small dragger	1
Certificates under section 24 of the regulations governing the inspection of canned fish and shellfish, etc., 27.	
Smelt gill-net	107
Smelt bag-net or box-net	45
Lobster pound or certificates—2	
	<hr/> 2,907 (1 cancelled)

DEPARTMENT OF FISHERIES

NOVA SCOTIA—DISTRICT No. 2—Supervisor E. D. Fraser

Kind of Licences	Number of Licences Issued	
Lobster fishing	3,499	(3 cancelled)
Certificates of identification—118 (1 cancelled)		
Licences to can lobsters.....	28	
Oyster fishery	200	(1 cancelled)
Quahaug fishery	27	
Cannery permits (fish or shellfish)	7	
Certificates under section 53—85 (1 cancelled)		
Lobster pound	4	
Seine	129	
Herring weir	18	
Trap-net fishing	93	
Salmon drift-net	45	
Salmon trap-net, pound-net or weir	189	
Special angling permits	105	(10 complimentary)
Set salmon gill-net	289	
Shad gill-net or drift-net	65	
Smelt dip-net fishing permits	928	
Special oyster permits (contaminated areas)	12	
Licences to a captain of a Canadian fishing vessel (using an otter or other trawl)	2	
Scallop fishery	1	(1 cancelled)
Certificates under section 24 of the regulations governing the inspection of canned fish and shellfish, etc.—262 (1 cancelled)		
Smelt gill-net	129	
Smelt bag-net or box-net	180	
Lobster pound certificates—140		
Interim receipts—Nil		
	5,950	(5 cancelled and 10 complimentary)

NOVA SCOTIA—DISTRICT No. 3—Supervisor H. H. Marshall

Kind of Licences	Number of Licences Issued	
Lobster fishing	3,621	
Certificates of identification—25		
Licences to can lobsters (lobster meat)	4	
Cannery permits (fish or shellfish)	8	(1 cancelled)
Certificates under section 53—157 (2 cancelled)		
Lobster pound	9	(1 cancelled)
Herring weir	47	
Trap-net fishing	171	
Salmon drift-net	2	
Salmon trap-net, pound-net or weir	33	
Salmon net permits (Medway river)	20	
Special angling permits	390	(3 cancelled)
Set salmon gill-net	271	
Shad gill-net or drift-net	Nil	
Salmon gill-net licences (Medway river estuary).....	88	
Smelt dip-net fishing permits	182	
Pollock purse-seine	3	
Scallop fishery	46	
Small dragger	1	
Smelt gill-net	37	
Smelt bag-net or box-net	18	
Permit for scientific purposes	1	
Lobster pound certificates—822 (3 cancelled)		
	4,952	(5 cancelled)

NEW BRUNSWICK—DISTRICT No. 1—Supervisor F. E. Justason

Kind of Licences	Number of Licences Issued	
Lobster fishing	352	
Certificates of identification—12		
Licences to can lobsters	1	
Cannery permits (fish or shellfish)	11	
Certificates under section 53—15		
Lobster pound	7	

NEW BRUNSWICK—DISTRICT No. 1—Supervisor F. E. Justason—*Concluded*

Kind of Licences	Number of Licences Issued
Herring weir	558
Clam permits	204
Salmon gill-net or drift-net	78
Herring seine	26
Shad gill-net or drift-net	32
Scallop fishery	40 (1 cancelled)
Small dragger	1
Certificates under section 24 of the regulations governing the inspection of canned fish and shellfish, etc.—Nil	
Smelt gill-net	Nil
Smelt bag-net or box-net	Nil
Lease of Dark Harbour fishing privileges—1	
Lobster pound certificates—2,737	
	<hr/> 1,310 (1 cancelled)

NEW BRUNSWICK—DISTRICT No. 2—Supervisor T. C. Collette

Kind of Licences	Number of Licences Issued
Lobster fishing	2,540 (1 cancelled and 15 free)
Certificates of identification—41	
Licences to can lobsters	53 (4 cancelled)
Oyster fishery	914
Quahaug fishery	110
Cannery permits (fish or shellfish)	11
Certificates under section 53—228	
Lobster pound	4
Gaspereau pound-net or trap-net	110
Salmon gill-net or drift-net	184 (1 cancelled)
Salmon trap-net, pound-net or weir	381
Special angling permits (black salmon)	44 (6 cancelled)
Tomcod trap-net	6 (4 cancelled)
Shad gill-net or drift-net	1
Permits authorizing the catching of pickerel, suckers, chub, perch and other coarsefish	1
Scallop fishery	1
Certificates under section 24 of the regulations governing the inspection of canned fish and shellfish, etc., 743 (21 missing, 1 cancelled)	
Smelt gill-net	246
Smelt bag-net or box-net	5,115 (35 free)
Lobster pound certificates—789	
	<hr/> 9,721 (16 cancelled and 50 free)

NEW BRUNSWICK—DISTRICT No. 3—Supervisor L. H. Parks

Kind of Licences	Number of Licences Issued
Sturgeon fishery	3
Gaspereau pound-net or trap-net	Nil
Salmon gill-net or drift-net	108 (1 cancelled)
Salmon trap-net, pound-net or weir	93
Special angling permits (Black salmon)	1,232
Gaspereau gill-net	145
Shad dip-net fishing permits	86
Whitefish gill-net permits (Grand Lake-Chiputneticook System)	96
Shad gill-net or drift-net	193
Permits authorizing the catching of pickerel, suckers, chub, perch and other coarsefish	134
Bass fishery	7
Smelt bag-net or box-net	Nil
Pickerel permits (hook and line)	174
Interim receipts—Nil	
	<hr/> 2,271 (1 cancelled)

DEPARTMENT OF FISHERIES

PROVINCE OF BRITISH COLUMBIA—Chief Supervisor J. A. Motherwell

Kind of Licences	Number of Licences Issued	
Abalone fishery	5	
Indian permits	2,029	(1 cancelled)
Crab fishery	103	
Smelt or sardine fishery	56	
Miscellaneous	122	
Salmon fishery licences for gill-nets or drift-nets.....	5,320	(66 cancelled)
Salmon trolling	3,188	(11 cancelled)
Salmon trap-net	5	
Salmon purse-seine	350	
Salmoon drag-seine	9	
Licences to a captain of a salmon purse-seine boat.....	241	
Grayfish fishery	406	(1 cancelled)
Licences to assistant operators of salmon (purse or drag) seines	1,954	(1 cancelled)
Licences to assistants in a boat used in operating a salmon gill-net or drift-net	724	(61 cancelled)
Cod fishery	436	(14 cancelled)
Whaling	3	
Licences to captain of a Canadian halibut or cod fishing boat, etc.	7	
Small dragger licences to inshore fishermen	45	(2 cancelled)
Licences to a captain of a Tuna fishing boat	1	
Licences to assistant operators on a Tuna fishing boat....	1	
Herring gill-net or drift-net	33	
Herring purse-seine	63	
Pilchard purse-seine	27	
Licences to a captain of a herring purse-seine boat	50	
Licences to a captain of a pilchard purse-seine boat.....	22	
Licences to assistant operators of herring purse-seines...	571	
Licences to assistant operators of pilchard purse-seines...	160	
Herring pound permits	10	
Fur seal skin certificates—Nil		
	15,941	(157 cancelled)

YUKON DISTRICT

Kind of Licences	Number of Licences Issued
Special fishery	29

PACIFIC COAST

Kind of Licences	Number of Licences Issued
Licences to United States halibut fishing vessels	215

ATLANTIC COAST

Kind of Licences	Number of Licences Issued
Licences to United States fishing vessels	57

NORTHWEST TERRITORIES

Kind of Licences	Number of Licences Issued
Special fishery	13 (6 cancelled)
Reduction works	Nil
Walrus	10 (incomplete)
Walrus export permit	1
	24 (6 cancelled)

HUDSON BAY AND JAMES BAY

Kind of Licences	Number of Licences Issued
Permit for scientific purposes	1
Special angling permits.....	Nil
Experimental commercial fishing permits	6
	7
Total	46,657 (193 cancelled) 10 complimentary and 50 free)

APPENDIX No. 9

ANNUAL REPORT ON FISH CULTURE BY J. A. RODD, DIRECTOR OF FISH CULTURE

Fish cultural operations in 1940 were carried on by the Department of Fisheries in those provinces, namely, Nova Scotia, New Brunswick and Prince Edward Island, where the fisheries are entirely, or to a large extent, under federal administration.

The total output from the hatcheries operated by the department in 1940 was 27,931,845, over 78 per cent of which was distributed in the fingerling and older stages. The numbers of each species distributed were:—

STATEMENT BY SPECIES OF THE FISH AND FISH EGGS DISTRIBUTED FROM THE HATCHERIES DURING THE YEAR ENDED DECEMBER 31, 1940

Species	Eyed Eggs	Fry	Advanced Fry	Fingerlings	Yearlings and Older	Total Distribution
<i>Salmo salar</i> -Atlantic salmon.....		275,000	3,508,600	11,759,474	79,260	15,622,334
<i>Salmo rivularis</i> Kamloops-Kamloops trout.....					125	125
<i>Salmo salar</i> ouananiche-Ouananiche salmon.....					1	1
<i>Salmo salar</i> sebago-Sebago salmon.....					13,791	13,791
<i>Salmo irideus</i> -Rainbow trout.....				237,902	10,144	248,046
<i>Oncorhynchus nerka</i> -Sockeye salmon.....	946,494					946,494
<i>Salvelinus fontinalis</i> -Speckled trout.....		82,000	1,147,383	9,693,366	115,305	11,038,054
<i>Cristivomer namaycush</i> -Salmon trout.....				63,000		63,000
	946,494	357,000	4,655,983	21,753,742	218,626	27,931,845

The following classification of eggs, fry and fingerlings applies to all statements and references in this report:—

Green Eggs.—Eggs until they are “eyed”.

Eyed Eggs.—Eggs showing the eyes of the developing fish.

Fry.—Fish from date of hatch until free-swimming with the food sac fully absorbed. (No fry are distributed until the sac is fully absorbed.)

Advanced Fry.—Fry that are feeding systematically.

No. 1 Fingerlings.—Fish that are feeding from two to eight weeks.

No. 2 Fingerlings.—Fish that are feeding from eight to fourteen weeks.

No. 3 Fingerlings.—Fish that are feeding from fourteen to twenty weeks.

No. 4 Fingerlings.—Fish that are feeding from twenty to twenty-six weeks.

No. 5 Fingerlings.—Fish that are feeding from twenty-six weeks to one year from date of hatch.

Thirteen main hatcheries, one subsidiary hatchery, six rearing stations, seven salmon retaining ponds and several egg-collecting camps were operated. The output therefrom was as follows:—

THE FOLLOWING TABLE SHOWS THE HATCHERIES OPERATED, THEIR LOCATION, DATE OF ESTABLISHMENT, THE SPECIES AND THE NUMBER OF EACH SPECIES DISTRIBUTED FROM EACH HATCHERY DURING 1940

Estab- lished	Hatchery	Location	Species	Eyed eggs	Fry	Advanced fry	Fingerlings					Year- lings and Older	Total distri- bution by species	Total distri- bution by hatcheries
							No. 1	No. 2	No. 3	No. 4	No. 5			
1929	Antigonish.....	St. Andrews, N.S.	Atlantic salmon. Rainbow trout.....	.....	.....	.....	910 400 101 522	.....	.....	.....	.....	.....	910 400 101 603	.....
1876	Bedford.....	Bedford, N.S.	Speckled trout..... Atlantic salmon.....	.....	.....	.....	2 057 457 11 699	80 000	33 500	.....	.....	35 724	2 621 681	3 633 684
1937	Cobequid.....	Jackson, N.S.	Speckled trout..... Atlantic salmon.....	.....	.....	.....	294 080 585 000	75 550	76 012	.....	.....	.....	32 699 314 080	326 779
1938	Coldbrook (f).....	Coldbrook, N.S.	Speckled trout..... Rainbow trout.....	.....	.....	.....	207 597	.....	.....	.....	.....	18 161	1 031 502	1 295 320
1936	Grand Lake (f).....	Wellington Station, N.S.	Speckled trout..... Atlantic salmon..... Ouaniche salmon..... Sobago salmon.....	.....	.....	.....	.....	12 000 135 000 188 000	27 340 205 060 277 000	.....	.....	79 260	39 340 340 000 511 200	379 340
1937	Kejimikujik (f).....	New Grafton, N.S.	Speckled trout.....	.....	.....	.....	.....	.....	.....	.....	.....	11 134	11 134	.....
1912	Lindlof.....	St. Peters, N.S.	Atlantic salmon..... Speckled trout.....	.....	.....	.....	43 186 360 000	30 500	267 000	9 038	.....	19 225	267 000	601 624
1902	Margaree.....	N. E. Margaree, N.S.	Speckled trout..... Atlantic salmon.....	.....	.....	.....	523 000 370 000	179 276	333 563	.....	.....	2 256	683 863	349 722
1935	Mersey River (f).....	Liverpool, N.S.	Speckled trout.....	.....	.....	.....	850 404	233 274	160 000	26 137	.....	2 256	300 069	1 414 532
1913	Middleton.....	Middleton, Annapolis Co., N.S.	Atlantic salmon..... Salmon trout.....	.....	.....	.....	.....	111 600 291 000	195 000	160 000	54 171	2 212	1 495 251	3 999 486
1933	Nictaux Falls (f).....	Nictaux Falls, N.S.	Speckled trout.....	.....	.....	.....	399 000	335 900	154 100	4 980	.....	.....	437 000	111 600
1929	Yarmouth.....	South Ohio, N.S.	Atlantic salmon..... Klamloops trout.....	.....	.....	.....	133 000 100 000	30 000	60 000	24 000	.....	.....	133 000	1 393 980
1939	Charlo.....	River Charlo, N.B.	Rainbow trout..... Speckled trout.....	.....	.....	.....	430 000 417 612	194 000 1 202 751	15 000 145 000	17 600	11 000	10 000 442	918 042	1 187 167
1928	Florenceville.....	Florenceville, N.B.	Speckled trout.....	.....	.....	.....	700 000	537 809	66 000	.....	.....	125	1 620 363	1 706 363
1880	Grand Falls.....	Grand Falls, N.B.	Speckled trout.....	.....	.....	.....	885 500	515 000	43 300	.....	.....	36 814	1 237 809	2 100 123
1874	Miramichi.....	South Esk, N.B.	Speckled trout..... Atlantic salmon.....	.....	.....	.....	310 000 73 388	299 544	339 345	.....	.....	.....	922 034	2 582 177
1914	St. John.....	St. John, N.B.	Speckled trout..... Rainbow trout.....	.....	.....	.....	1 902 680 225 000	1 967 849 365 393	.....	.....	.....	51	3 170 180	3 227 231
1938	Cardigan (f).....	Cardigan, P.E.I.	Speckled trout..... Rainbow trout.....	.....	.....	.....	598 500	28 126	.....	.....	.....	63	622 499	.....
1906	Kelly's Pond.....	Southport, P.E.I.	Speckled trout.....	.....	.....	.....	.....	59 500	82 040	.....	.....	420	824 041	1 449 256
1911	Anderson Lake (a).....	Anderson Lake, Kildonan, Vancouver Island, B.C.	Atlantic salmon..... Sockeye salmon.....	.....	.....	.....	316 540 95 000	59 500 52 087	362 000	115 500	.....	.....	337 000	619 040
				946 494	337 000	4 655 943	5 162 417	3 224 100	478 478	95 175	218 626	27 931 845	27 931 845	

(a) Subsidiary hatchery.

(f) Rearing station.

(e) Autumn collection 1940.

The eggs, fry and fingerlings included in this distribution, with the exception indicated, were from collections in the autumn of 1939 and the spring of 1940.

Four thousand, eight hundred and ten Atlantic salmon were obtained for fish cultural purposes and retained at the various retaining ponds operated in the Maritime Provinces and include 2,612 purchased from fishermen and 2,198 taken in departmental traps. The approximate average weight of the salmon impounded at each pond, in pounds, was: Margaree 11.4; River Philip 15; Sackville 5.4; Saint John 9.4; Miramichi 8.5; New Mills 15.1; Jacquet River 6 and Morell 9. Some 21,138,600 salmon eggs were secured.

At the Antigonish hatchery the production of speckled trout eggs from pond fish exceeded all previous collections at this point in any one year by 12,577,300 or 133 per cent. This hatchery produced the record total this year of 22,026,000 ova. The previous year's collections of this species were also exceeded at the Cobequid, Lindloff and Yarmouth hatcheries.

Over 56,900 Atlantic salmon fingerlings were marked by removal of the adipose and either the right or the left pectoral or the right or the left ventral fins and distributed from Cobequid, Margaree and Middleton establishments, bringing the total distribution of marked Atlantic salmon at all hatcheries from 1935 to 1940 inclusive to 785,356. The recapture of these marked salmon if reported, will add to present data in regard to the "homing" theory, sea movements or migrations of this species. Unfortunately, the commercial fishermen, anglers and others interested in salmon angling have not co-operated in reporting the recapture of these marked fish to the extent that was hoped and expected, although \$1 is paid for information as to the date, length, weight and place of recapture of each fish accompanied by a number of their scales and the scars due to the removal of the fins. Some 144,743 speckled trout with clipped adipose and one side fin were also distributed in 1940.

The tagging and marking of Atlantic salmon, speckled trout, etc., and the recaptures of tagged and marked fish that were reported in 1940 are summarized in statements given later in this report.

Prophylactic and sanitary measures were taken on an extensive scale to prevent the outbreak of disease at all hatcheries and rearing ponds. Experiments with equipment, methods and foods of various kinds were continued at several hatcheries.

As the price of beef liver, at one time the standard fish food used in fish cultural work, and other meat products has increased to such an extent, with corresponding increases in fish production costs, fish culturists generally have been experimenting for many years with a great variety of foods and combinations with the hope of finding a less costly and equally or more efficient ration for hatchery fish. The feeding tests that were carried on during 1940 and their results are summarized in the reports of the superintendents of the respective hatcheries and rearing ponds appearing later in this report.

A notable advance was made, on behalf of this department, towards the solution of this feeding problem during 1940, inasmuch as Doctor W. D. McFarlane, Professor and Chairman of the Department of Chemistry, Macdonald College, McGill University, undertook an investigation of the composition of some natural foods of Atlantic salmon and speckled trout fry in the Maritime Provinces. From the results of these analyses, rations will be formulated to approximate as closely as possible the composition of the natural food. These rations will be fully tested in a comprehensive series of feeding tests that will be carried on with fry and fingerlings at several hatcheries during 1941.

The management of eight lakes in Charlotte County, New Brunswick, is proceeding as planned. These lakes are being stocked on an acreage basis and with numbers of speckled trout graded according to the age of the fish that are being distributed in them. These lakes with their tributary streams are closed to fishing as they are stocked and will not be re-opened until the fish distributed in them are three years old. A creel census will begin with the re-opening of each lake. In 1939, Bonaparte Lake was stocked with No. 2 fingerlings; Limeburner Lake with No. 5 fingerlings, and Johnson and Kerr Lakes with yearling

speckled trout. In 1940, St. Patrick and Crecy Lakes were stocked with No. 2 fingerlings. Johnson and Kerr Lakes will be re-opened to angling and the creel census will begin April 1, 1941, when the yearlings distributed in them in 1939 will be three years old.

This investigation will add to present knowledge in regard to the effectiveness and the cost of stocking with three grades of speckled trout, in terms of catchable fish, the productivity of certain kinds of lakes, and the general requirements of good speckled trout waters.

The survey which preceded this investigation was made and the distributing ratios were arrived at by the staff of the Atlantic Biological Station.

Encouraging reports of improved angling have been received from many districts where hatcheries are operating.

The interest and co-operation of the general public and local organizations which were referred to in a previous report have been continued. Provincial fish and game protective associations have co-operated, and local fish and game clubs as well as angling and protective associations in many instances have assisted hatchery staffs as opportunity offered in the distribution of the season's output, particularly in waters in which these organizations are interested. Among those that were particularly helpful were the Kings County, N.S., Fish and Game Protective Association, associations in the Middleton and Yarmouth districts, N.S., and the Saint John, Fredericton, Schoodic (St. Stephen), Woodstock, Moncton, McAdam, Madawaska and Grand Falls branches of the N.B. Fish and Game Protective Association.

Valuable and much appreciated advice and co-operation were extended whole-heartedly by the Directors and staffs of the Atlantic Biological Station and the Halifax Fisheries Experimental Station, all of which are referred to in the report of the Fisheries Research Board.

A number of changes in the fish cultural staff took place during the year. Superintendent F. C. Hayley of the Kelly's Pond hatchery, P.E.I., who had reached the "age of retirement," was replaced by Superintendent C. A. Tait of the Cardigan rearing ponds. Superintendent J. D. Nichol of the Saint John hatchery, N.B., was retired for the same reason and replaced temporarily in an acting capacity by Hatchery Assistant P. B. Stratton. Superintendent H. V. Gates, Yarmouth hatchery, was retired late in the year on account of ill health.

Owing to the conditions brought about by the war, operations were not expanded, new construction was not undertaken, and replacements and repairs were confined to essentials. Inspections of possible egg-collecting waters and hatchery and rearing-pond sites were also restricted to what might be done by fish cultural officers in the discharge of their regular duties.

The Canadian National, the Canadian Pacific and the Dominion Atlantic Railway companies continued their generous assistance and co-operation by furnishing free transportation for shipments of game fish and game fish eggs with their attendants. The extent of this co-operation is indicated in the following summary:—

Railway	Total mileage on trip passes	Number of Passages	Mileage baggage car permits			Number of cases or cans			Number of Permits
			Full	Empty	Total	Full	Empty	Total	
C.N.R.....	2,621	8	3,256	3,036	6,292	45	44	89	25
C.P.R.....	62	1	87	137	137	1	9	9	3
D.A.R.....					87			1	1
	2,683	9	3,343	3,173	6,516	46	53	99	29

NOTE.—Number of passages refers to transportation one way—a return trip counting as two passages. Number of permits refers to one way passages for cases or cans.

A few years ago there was a sharp opposition by some people to the distribution of non-native speckled trout in the streams of one of the provinces on the ground that the fish would not have the same characteristics as those raised from native stock. As a consequence the distribution of speckled trout in that province was limited to the fry and fingerlings hatched from the comparatively small number of eggs collected from native wild fish from year to year.

Finally an agreement was reached that there should be an experimental distribution of trout from non-native hatchery-reared parents. Accordingly, speckled trout hatchery reared strain from another province, that had been domesticated for several generations, were marked and distributed in a few streams. The fish were marked by the removal of certain fins from each trout so that a later check could be made as to the growth and appearance of the "strangers" in comparison with the native stock.

These fish were introduced while in the fingerling stage. Quite recently, several specimens of marked non-native speckled trout and unmarked native speckled trout of practically the same size were caught. A careful check revealed that so far as size, usual markings, and general appearance of these fish were concerned there were no differences apparent. Thus confirmation is given to the belief that environment and not heredity is the greater influence in growth and appearance of fish and that trout distributed in their early stages quickly assume the general characteristics of the native fish.

In anticipation of the usual run of sockeye salmon to the Anderson Lake area arrangements were made in the fall of 1940 to collect one million eggs there for the purpose of continuing the distribution of this species in Maggie Lake which drains into Alberni Canal, B.C. The Anderson Lake run of sockeye proved to be the smallest that has been observed for many years. Water levels were above normal during the spawning period and as they would tend to greater-than-normal losses in naturally deposited eggs should low water prevail and the spawning beaches be exposed during the winter, the eggs that had been collected before the size of the run was apparent, 946,500, were planted at safe levels and in good condition at Anderson Lake.

A fish of unusual interest was exhibited at the Department. It was a speckled trout caught on September 12, 1940, in Quebec waters, and had a length of 30½ inches and an estimated weight of 11 pounds. The record speckled trout, so far as known, is the 14½ pound specimen taken in July, 1916, in the Nipigon River, Ontario.

In 1940 there does not seem to have been the same destruction of young fish through drought as occurred in 1939. Only one case is reported where the fisheries inspector had occasion to remove fry and fingerlings, from small brooks where the water was low, to larger streams.

Early run Atlantic salmon do not necessarily spawn before the so-called late run. In fact the opposite was the case in the New Mills district in both 1939 and 1940. In the latter year the early run was impounded May 22 to July 16 and the first eggs secured October 22, whereas the late run was taken in Jacquet River September 2 to October 16 and yielded their first eggs on October 16.

That rats may prey on hatchery product is shown by the experience of the superintendent of Cobequid hatchery in the spring of 1940. When the brush for insulation was being removed from around the intake pipe to one of the circular ponds a large rat ran out from under it. Upon examination a nest was found and beside it two piles containing 217 freshly killed specked trout from three to four and one-half inches long. Apparently these fish had been captured while in the shallow water around the margin of the ponds.

Collections, transfers and distributions are given to the nearest hundred in the summaries of operations at the respective establishments.

MARITIME PROVINCES

Senior District Supervisor of Fish Culture, James Catt

Fish Cultural operations in the Eastern Division were on the whole satisfactory and in some of its phases very marked progress was made, particularly in regard to a greatly increased collection of speckled trout ova and to the results obtained by selective breeding.

The co-operation of the Administrative Branch, the Fisheries Research Board, Provincial Governments and Fish and Game Protective Associations was all that could be desired. Through the courtesy of the Telegraph-Journal of Saint John, N.B., publicity was given to a request that anyone recapturing marked salmon or trout should report them to the department's officers.

The value of the course given Supervisors Tingley and Hills by the staff of the Atlantic Biological Station becomes increasingly apparent. The assistance of Doctors A. H. Leim, R. H. M'Gonigle and M. W. Smith in helping to analyze the material collected by the supervisors is much appreciated.

In spite of a reduction in the trained personnel of the hatchery staffs through the superannuation of Superintendents J. D. Nichol, Saint John, F. C. Hayley, Kelly's Pond, and H. V. Gates, Yarmouth, and the absence on military duties of Assistant M. N. Jordan of the Miramichi hatchery, on the whole the plants were operated very well and with very marked progress at some hatcheries and collecting stations.

The annual mortality caused by epidemics was, as usual, investigated by Dr. M'Gonigle. Losses in fry and fingerlings appeared rather unexpectedly at some plants but on the whole were considerably less than usual. Prophylactic and curative treatments were expanded to include the use of formalin at Kejimikujik, Saint John and Margaree. Superintendent Annis at Kejimikujik obtained excellent results with 1:6,000 formalin baths for his speckled trout fingerlings. The formalin treatment in each instance was followed by a salt bath.

At Saint John much stronger solutions were tested. As a therapeutic measure solutions of 1:1,250 and 1:2,500 were used on landlocked salmon yearlings affected with fin rot. The fish were treated for one hour at 59.9° Fht. rising to 63.9° Fht; pH 8.00 and oxygen saturation 96.1 per cent. No losses were incurred before or after the treatment. A similar curative treatment applied to speckled trout indicated they might have less resistance to the solution than landlocked salmon, for with water at 63° Fht. with a pH of 7.9 the fish began to die after fifty minutes in a 1:2,000 solution. This treatment, however, reduced the losses in the subsequent 19 hours to 170 as against 700 in an untreated control. Control and experimental groups each contained approximately 4,500 fingerlings. Subsequently all fingerlings were treated with a 1:4,000 solution with apparently very satisfactory results both from a preventive and curative point of view. At Margaree hatchery formalin was used satisfactorily in combatting Costia.

In the examinations of lakes carried out by the district supervisors in 1940 those waters previously stocked with rainbow trout were given preference with a view to determining what factors are necessary for successful stocking with the above mentioned species. Whilst all data have not yet been correlated it seems at present that exhaustion of oxygen during the winter in such waters as Afton Lake, Prince Edward Island, will prove fatal to trout although certain cyprinids may tolerate it.

Inefficient screening of the outlets appears to be the chief cause of failure to maintain a good number of rainbows in lakes otherwise suitable for the species. Long (Lindloff) Lake with its abundant enemy and predator fish population yet contains a considerable number of rainbows, indicating that, other conditions being favourable, this introduced species is able to establish itself to an unusual degree, predators and competitors notwithstanding.

McRae's Lake, Cape Breton, and Thompson's pond, Prince Edward Island, were also examined. These lakes are outstanding dissimilar "types" of excellent speckled trout waters. Robinson Lake, Saint John, a small pond void of fish other than eels was also investigated as was Burke's Lake, Kings County, Nova Scotia.

Results of stocking indicated by the recapture of marked fish clearly demonstrated the value of the fish culture service. Creel census reports were fairly satisfactory, from the areas near the Cobequid and Antigonish hatcheries. These dealt largely with speckled trout. A fair number of landlocked salmon originally from the Grand Lake ponds were recaptured and in the fall operations at Chamcook Lake Assistant T. K. Lydon reported 32.4 per cent of the total catch of landlocked salmon taken for stripping purposes were marked hatchery product. Similar results were secured in a census taken of the anglers' catches in Chamcook Lake during the year. In all, successful anglers landed 109 sebago salmon and 32.1 per cent proved to be salmon previously marked and distributed in the lakes. Greater co-operation on the part of the angling public in making returns of recaptured marked fish would be much appreciated by the Department.

As the result of a small distribution of speckled trout averaging about 3 ounces in Robinson's Lake, N.B., interesting information was obtained by the investigating officers. In ten months the fish had made a remarkable growth with an average weight of 32 ounces.

The Reardon brook fish previously used in an experiment to determine the effect of improved environment on stunted stock disclosed the fact that the fish had about reached their limit of growth with an average weight of $\frac{3}{4}$ lb. As at maturity they originally weighed only 0.8 ounces (average) the results appear excellent.

Egg collections in 1940 were most satisfactory. The Atlantic salmon ova obtained this year exceeded the collection of 1939 by over 1,000,000 and the number of speckled trout eggs secured was over 13,000,000 more than the previous year, largely owing to operations at Antigonish where twenty-two million eggs, an all time high for this species in federally operated hatcheries in Canada, were obtained. There was also a very satisfactory increase in the collections from the Lindloff plant and adjacent area.

Whilst for a number of reasons, including floods, the Atlantic salmon brood fish retained in the New Brunswick plants was below normal, increases at River Philip and Morell offset this.

Sea trout collections at Tweedie's Meadow brook were much below anticipation owing to very severe spates in the fall and spring. In the latter case high water prevented the establishment of the traps as early as had been expected. In the former case freshets permitting the fish to pass over and around the traps continued for many weeks.

Although late in starting, a satisfactory collection of wild speckled trout eggs was obtained from the Lake Utopia area.

The collection of landlocked salmon eggs was carried out in the Grand Lake area, Nova Scotia and at Chamcook Lakes area and Clinch brook, New Brunswick. Very heavy spates rendered the collection of ova somewhat abortive although the Clinch brook eggs did exceed in number the quantity taken in 1939.

It was of interest to note the improvement in the quality of the rainbow trout eggs obtained during the past year. The rainbow stock now at Saint John is limited to the wild progeny obtained from Crooked creek and this has produced a notable improvement in the quality of the eggs. A good improvement has also been shown in the quality of rainbow eggs secured from the ponds at Antigonish hatchery.

The value of selective breeding was very well demonstrated this year. At Antigonish a group of two year old speckled trout stock selected for productivity yielded an average of 1,773 eggs per female with the phenomenal maximum of 2,520. The average size of two year olds at this plant on November 2 was $14\frac{2}{3}$ ounces as against $16\frac{1}{3}$ ounces for three year olds.

Results from early spawning stock of McRae Lake origin indicated the desired trait capable of development. This season these fish spawned eighteen days earlier than their contemporaries of Antigonish pond stock.

At Margaree the average yield of selected fish of the three year old group was 1,491 eggs as against 1,057 of the general run of three and four year olds. The selected two year olds yielded an average of 1,184 eggs. Average weights of parents in these groups varied from $16\frac{1}{2}$ and $29\frac{3}{4}$ ounces at two and three years of age for selected fish to 19 ounces for the three and four year olds (mixed) and 28 ounces for the four year olds of general stock.

District Supervisor of Fish Culture, F. A. Tingley

The month of January and part of February was spent in the Saint John Office in general office work, perusal of filed correspondence and discussion with Supervisors Catt and Hills of matters pertaining to fish culture. An inspection of Saint John hatchery was made and on February 9 the conference of Fishery Supervisors at Halifax was attended. The period of February 25 to March 13 was spent at the Atlantic Biological Station, St. Andrews, N.B., classifying biological material collected from lakes and streams in the summer of 1939. The assistance of Doctors Leim, M'Gonigle and Smith in this work is greatly appreciated.

Between March 21 and April 1, oxygen determinations were obtained from under the ice in Afton, Glenfinnan, O'Keefes and Verde Lakes, and Weisner's pond in Prince Edward Island. Oxygen concentration under the ice of Neil's Lake near Moncton, N.B., also was determined. On April 26 and 27 a trap for in-running fish was installed in the outlet stream of Neil's Lake. The period of April 28 to July 6 was spent chiefly in inspection of hatcheries and rearing ponds, and examination of the following lakes in Nova Scotia: Boar Back, Tedford and Jesse Lakes were visited for examination of the outlet screens, and Trefry's Lake was examined to determine whether food organisms had returned in sufficient quantity to justify restocking. Clear, Round, Bird, Giant's and Smelt Lakes were examined for rainbow trout. MacRae and Utley Lakes also were examined. A site in Halifax County on St. Margaret Bay for rearing trout fingerlings in tidal water was examined. Some tests were made at Kejimikujik rearing ponds to determine toleration by trout fingerlings of varying proportions of fresh and sea water.

July 7 to 24 was spent in Saint John, chiefly in office duties and in re-hanging and repairing gill nets and a minnow seine.

On July 27 the Department was represented at Sydney in the oral examination of candidates for the position of Assistant at Lindloff hatchery. While in Cape Breton, the feasibility of collecting speckled trout eggs at Trout brook, Lake Ainslie was examined. Examinations of O'Keefes and Glenfinnan Lakes, rainbow trout waters on Prince Edward Island, and also Thompson's pond, a speckled trout water, were made. This work was done in the period July 31 to August 14. Returning to Saint John, a few days were spent at the Office, and fishing tests made in Robinson's Lake on August 20 and 21. On August 23 a fingerling survival test at Lake Mulgrave and more examinations of Nova Scotia lakes were made. Lakes Midway, Brazil, Little Brazil and Pugg were examined on this trip before return was made to Saint John on September 14.

September 16 to 28 was spent chiefly at the Saint John office. During this period assistance was given Supervisor Catt in an attempt to collect Odonata

larvae at Stephenson's pond for Doctor W. S. McFarlane's investigation of trout diets. A fyke net was set in Trout brook, Lake Utopia, on September 27 for the capture of speckled trout. A second net was set at a later date, and 2 fish fences installed at Flaherty springs on Spear's brook. The egg collection was fairly successful, though as a result of freshets it was smaller than in 1939. The camp was closed on November 19.

An inspection was made at Tweedie's Meadow brook on September 28 to ascertain the extent of damage to the fish fences by a heavy freshet in that area, and to determine the feasibility of repairing the damage during the season. A second visit to observe conditions was made on October 21. A visit was made to this camp on November 7 to strip trout and supervise the packing and transfer of eggs to Miramichi hatchery. En route from New Mills pond on November 14, another visit was made to this camp to observe the stripping of the remaining trout. Further fishing tests were made in Robinson's Lake in October. Between November 26 and December 11, the autumn inspections of Kelly's Pond, Cobequid, Bedford, and Yarmouth hatcheries, and Grand Lake rearing ponds were made. The period of December 12 to December 21 was spent at the Saint John office.

District Supervisor of Fish Culture, A. P. Hills

The period from January 2 to 29 was spent at the Saint John office, reading files, submitting reports, inventories, et cetera. On January 30 an examination was made of the Sissiboo River power dam site, located approximately three miles above Weymouth, with a view to determining the possibilities of establishing rearing ponds at that site. In view of the war situation and the decision that no new developments are to be undertaken at this time, further observations such as summer temperatures, pH, et cetera, were not made. At Saint Andrews, N.B., in February analyses of material, collected during the examination of waters in the summer of 1939, was carried out at the Atlantic Biological Station. Dr. Leim kindly offered the use of a laboratory and equipment at the station for this work, and the valuable assistance of Doctors Leim, McGonigle and Smith was very much appreciated.

While at Saint Andrews accompanied by Doctor M. W. Smith, attendance was made at the annual conference of Fishery officers, representatives of the Fish and Game Protective Association, et cetera, convened by the District Supervisor of Fisheries at Saint Stephen, N.B.

Spring inspections of the following establishments were made from May 28 to June 23 inclusive: Burpee brook, Florenceville hatchery, Grand Falls hatchery, Three brooks deadwater, Charlo hatchery, Benjamin and Jacquet Rivers, New Mills pond, Miramichi hatchery, Kelly's pond hatchery and local waters, Cardigan rearing ponds, and possible rearing pond sites for Moncton Branch of the Provincial Fish and Game Protective Association.

The following waters were examined and reports thereon submitted from July 13 to October 6, inclusive: Clear Lake, Charlotte County, New Brunswick; Burke's Lake, Kings County, Spectacle Lake, Lunenburg County, Cranberry, Kempt, Nancy, First Tupper and Deep Lakes, Queens County, Nova Scotia; O'Keefe's and Glenfinnan Lakes, and Thompson's pond, Prince Edward Island; Clam Lake, Shelburne County and Lily Lake, Annapolis County, Nova Scotia. Assistance was also given Supervisor Catt in examination of Clear Lake, Saint John County, New Brunswick. Rainbow trout have been distributed in all the waters with the exceptions of Burke's Lake and Thompson's pond.

Traps were again installed in Clinch brook, tributary to Little Magaguadavic Lake, for the purpose of collecting landlocked salmon ova. While the total collection of approximately 41,200 was slightly larger than that of the

previous season, it did not come up to expectations. Better results might have been obtained had the fences been installed some ten days earlier, but this can only be conjecture.

The eggs collected at this point were again laid down at Florenceville hatchery for incubation, and the seasonal operations carried out with the assistance of the Superintendent of Coldbrook rearing ponds.

Autumn inspections were made between October 24 and December 10 of the following establishments: Florenceville, Grand Falls (and Three brooks dead-water), Antigonish, Lindloff, Margaree, Middleton and Yarmouth hatcheries and Margaree salmon pond. The balance of the year was occupied with office work at Saint John.

ANTIGONISH HATCHERY

K. G. Skillington, Superintendent

At this establishment 22,026,000 speckled trout eggs were collected from the hatchery ponds between October 12 and December 21, and laid down in the Antigonish hatchery. This is more than double the quantity taken last year at this plant, and sets a new all-time record for the number of eggs of this species taken from hatchery reared fish at any of the Maritime hatcheries. The local ponds also supplied 280,000 rainbow trout eggs between March 30 and April 26. These collections were supplemented by receipt of 1,000,000 Atlantic salmon eyed eggs from Margaree hatchery on April 12. Outgoing shipments of speckled trout eyed eggs in March were—to Cobequid 1,000,000; Kelly's 800,000; Florenceville 10,000; Middleton 200,000 and Bedford 1,200,000. The following distributions were made—910,400 Atlantic salmon; 101,600 rainbow trout and 2,621,700 speckled trout. These include 81 rainbow trout, 5 year olds, and 35,005 speckled trout yearlings, 2, 3, and 4 year olds marked by the removal of the adipose and right pectoral fins.

Selective breeding of parent speckled trout stock has shown decided progress during the last three years. The average egg yield per female for one year fish in 1938 was 439; in 1939, 751 and in 1940, 910; for 2 year stock in 1938 it was 1,058 and in 1940, 1916; for 3 year stock in the three respective years, 1,148, 1,190, 1,971 and for the 4 year and older trout 1,285, 1,399 and 1,393. Two year old McRae Lake stock yielded only 516 eggs per female as against a 2 year selected stock yield of 1,916. Three, two year trout of the non-selected variety weighted $2\frac{1}{2}$ pounds, whereas, 3 fish of the same age, but of the selected group, weighed $9\frac{1}{4}$ pounds.

Experiments in feeding speckled trout fingerlings with cod liver residue, September 10 to October 2, both alone and mixed with liver, 50 per cent of each, did not give satisfactory results, as in the former case the fingerlings actually lost weight, and in the latter the gain was only 29 per cent of what it was in the control fed all liver. Another experiment with speckled trout fingerlings, August 22 to October 2 using six diets (1) fish 6 days, liver one day, (2) 50 per cent fish plus 50 per cent liver, (3) 25 per cent fish plus 75 per cent liver, (4) 75 per cent fish plus 25 per cent liver, (5) 100 per cent fish and (6) 100 per cent liver, indicated best growth using Diet 6, but with Diet 3, almost equal to it, and Diet 2 a fairly close third. These first two diets also gave the least (and the same) loss. The most economical food on the basis of cost to produce one pound of trout was the all fish diet.

In last year's report results from feeding tests in 1939 with 3 year and one-year old parent speckled trout were given up to the spawning time. The eggs from each group were kept separately over the winter of 1939-40. The diets as fed parent trout 1939 for 3 year stock were: (1) 100 per cent fish (sardines), (2) 100 per cent sheep plucks, (3) fish and one feed of plucks per week, and (4) fish and one feed of plucks in two weeks. The least percentage

loss in eggs up to March 16, 1940, was in that group whose parents had been fed diet 3; from March 16 to April 20, diet 2; and from April 20 to June 15 diet 4, with diet 3 a close second. The diets as fed one-year stock were: (1) fish and one feed of plucks per week, (2) 50 per cent fish plus 50 per cent plucks. The least percentage loss in eggs up to March 16 was in that group whose parents had been fed diet 1, and from March 16 to April 20 and April 20 to June 15, diet 2.

An experiment was conducted to determine the effect of non-feeding of parent 2 year old speckled trout before spawning. A group was not fed from July 15, 1939, to spawning time in November. Thirty of the females yielded an average of 539 eggs each. The percentage loss to hatch was 40.1. Three hundred and twenty-three eggs per female hatched and the loss in fry to June 1 was 20.9 per cent. In the second group fed as usual, 20 females yielded an average of 1,058 eggs with a percentage loss to hatch of 15.5; 894 eggs per female survived and the loss in fry to June 1 was 12.3 per cent. An experiment was tried in fertilizing eggs from two-year old speckled trout with different amounts of milt. Using heavy milt, the percentage loss in eggs to April 20 was 13.8, and from that date to June 1, 15.4 per cent. Corresponding figures using light milt were 11.5 and 13.1 per cent. Another experiment consisted in fertilizing two-year female speckled trout, with milt from 1 year and 2 year males. In both cases the percentage loss was the same to April 20, but from April 20 to June 1, it was 16.4 per cent using one-year males and 18.1 per cent using two-year males. Machinery was installed in the cold storage building erected last year, and the plant was placed in operation and used successfully this year. Hydro electric power was supplied, grounds improved and minor repairs made around the establishment as necessary.

BEDFORD HATCHERY AND SACKVILLE RIVER SALMON-RETAINING POND

George Heatley, Superintendent

On March the fourth, 440,000 Atlantic salmon eyed eggs were received from Middleton hatchery, and on the fifteenth of the same month, 1,200,000 speckled trout eyed eggs from Antigonish hatchery. Between November 4 and 16, 635,700 Atlantic salmon ova were laid down from Sackville pond, and between November 9 and 16, 2,165,000 eggs of the same species from River Philip pond. Outgoing shipments consisted of 300,000 Atlantic salmon advanced fry to Kejimikujik, June 8-17; 682,400 fry and fingerlings of the same species to Grand Lake May 8-July 12; and 390,600 speckled trout fry to Coldbrook May 25-June 4. In addition 20,500 Atlantic salmon eggs were supplied Dalhousie University, and 2,000 advanced fry and fingerlings of the same species to the Fisheries Research Board for Moser River. Distributions from Bedford for the season were 12,700 Atlantic salmon and 314,100 speckled trout.

A closed circulating system was operated March 31 to May 11 with five troughs of eggs from yearling, 3 and 4 year old speckled trout. In this system the eggs hatched out 8 to 11 days earlier, but the loss was much heavier than in the regular open system. Bedford staff assisted in all distributions from Grand Lake rearing station and for three days while the Coldbrook rearing establishment was making its distribution. A well was bored for domestic purposes, nine hatching troughs and four foot-tanks were built, and the grounds improved generally.

The largest collection of Atlantic salmon eggs since 1937 was made at Sackville pond this season. Between September 17 and November 10, 223 fish were taken, out of which 150 females, between November 4 and 16, yielded 635,700 eggs, all of which were laid down in Bedford hatchery. The parent salmon impounded were a little larger than last year averaging 5.4 pounds in weight as against 4 pounds in 1939.

COBEQUID HATCHERY AND RIVER PHILIP SALMON-RETAINING POND

J. W. Heatley, Superintendent

On March 12 to supplement the quota then on hand 1,000,000 speckled trout ova were received from Antigonish hatchery. Between November 5 and 13, some 3,019,400 Atlantic salmon eggs were secured from River Philip pond, and from October 17 to December 19, 1,852,100 speckled trout ova were taken from fish in the hatchery ponds. In the fall 5,400 yearling speckled trout were transferred to Grand Lake rearing ponds. Distributions for the season were, Atlantic salmon 1,031,600 and speckled trout 263,700, including 18,036 trout and 22,215 salmon marked by the removal of the adipose and right ventral fins. Twelve new V-type lattice pond shades were made. In selective breeding 45 groups of eggs from selected pairs of two-year old speckled trout were segregated and will be carried through separately from the others. Selection was made on the basis of early spawning, quantity and quality of eggs, etc.

An experiment in feeding Atlantic salmon fingerlings held in troughs was conducted from June 19 to August 15, using the following diets: (1) 100 per cent beef liver, (2) 100 per cent beef hearts, (3) 50 per cent beef liver plus 50 per cent beef hearts, (4) 50 per cent beef liver plus 50 per cent fish meal. The greatest increase in weight and length was on Diet 1. Least loss was on Diet 2, and greatest weight of survivors was on Diet 3. Another experiment with the same species held in rearing tanks from August 16 to October 5 was tried using diets (1) 100 per cent liver, (2) 100 per cent Novascot fishblox, (3) 25 per cent liver plus 75 per cent fishblox, (4) 50 per cent liver plus 50 per cent fishblox, (5) 25 per cent liver plus 25 per cent sheep plucks plus 50 per cent fishblox. Diet 5 produced the greatest increase in weight and length and in weight of survivors. The least loss with with Diet 4, but this was only slightly less than with Diet 5.

River Philip pond was in charge of Assistant I. A. Mowat from Charlo hatchery. Necessary repairs were made to the dam, retaining pond, buildings, et cetera, and between September 23 and November 16 some 1,175 salmon averaging 15 pounds in weight were captured, which yielded November 5 to 16 over 7,337,700 eggs—the best collection at this pond since it was opened in 1928, and the best yield per female since 1936. Allotments were: 3,019,400 to Cobequid; 2,165,000 Bedford; 1,060,000 Middleton and 1,093,400 Lindloff. Aluminum tags were affixed to 500 of the parent salmon before they were released in River Philip.

COLDBROOK REARING PONDS

E. Barrett, Superintendent

Between May 25 and June 4 some 390,600 speckled trout fry were received from Bedford hatchery and on June 28, forty thousand rainbow trout fingerlings arrived from the establishment at Yarmouth. Middleton and Bedford trucks assisted in making the distributions which amounted to 39,300 rainbow and 340,000 speckled trout. Valuable assistance was also rendered by a number of the members of the King's County Fish and Game Protective Association and by the Fishery Inspector for the district. During the season thirty shades were built for the circular ponds, grounds were improved and the ponds relined with fresh gravel. A hard formation, apparently of algal growth, grew up the slope of the ponds, forming particularly under the shades. It was kept under control by lowering the water frequently, applying salt and exposing the growth to sunlight and air.

GRAND LAKE REARING PONDS

J. M. Butler, Superintendent

Bedford hatchery supplied the Grand Lake rearing ponds with 682,400 Atlantic salmon fry and fingerlings between May 8 and July 12, and in the fall Cobequid transferred thereto, 5,400 speckled trout yearlings, for winter rearing. In November, 43,500 sebago salmon eggs were secured from wild fish taken in Grand Lake and 16,500 were obtained from the stock maintained in the hatchery ponds. Distributions for the season were made with the assistance of the Bedford truck and consisted of 571,300 Atlantic salmon, 11,100 sebago salmon and 19,200 speckled trout. Some 11,138 of the two and three-year old seabagos were marked before being released by clipping their adipose and right ventral fins. Fifty Atlantic salmon fingerlings and 10 sebago parent fish were sent to the University of Toronto to be used in an investigation being conducted there. One hundred Atlantic salmon fingerlings were supplied Dr. A. G. Huntsman for use in temperature resistance test at Halifax, and 6,500 fingerlings of the same species to the Fisheries Research Board for Moser River.

An experiment was made in feeding sebago salmon three-year old parents from June to November. Those fed half the usual quantity of food produced a larger number of egg-bearing females and a greater yield per fish than did those on full or those on one-quarter the regular feed. During the year the grounds were improved and ponds repaired with clay and gravel.

KEJIMKUJIK REARING PONDS

F. F. Annis, Superintendent

The first allotment of advanced fry to arrive at the ponds was 100,000 speckled trout from Yarmouth on May 11. This was followed by 300,000 Atlantic salmon advanced fry from Bedford between June 8 and 17. Good growth in the fingerlings was made during the season and distributions completed October 1. The output amounted to 267,000 Atlantic salmon and 82,700 speckled trout. The growth of algæ which was heavy and a nuisance early in the season was overcome by draining the ponds daily to half full and exposing the algæ therein to the sun's rays so long as the safety and welfare of the fish permitted. For external parasites, fungus and as a general conditioner, formalin was used with good results in the ratio of one part per 6,000. Eleven such treatments followed by brine solution were given during the season. The trout at no time lost their bright colour, they had hardly any white spot, and fed well all summer. Results with salmon were equally satisfactory. Forty-five pond shades of the V type were completed.

LINDLOFF HATCHERY

Wm. T. Owens, Superintendent

The eggs on hand from the 1939 fall collection were supplemented by receipt on February 17 and March 2 of 1,000,000 speckled trout ova from Margaree hatchery. Fall collections of speckled trout eggs were made from the hatchery ponds, Lindloff and McRae Lakes. The ponds, from one-year and two-year stock, produced 518,400 eggs as compared with 17,700 the previous year. Lindloff Lake was a new venture and yielded 15,700 ova. McRae Lake produced 170,000 as compared with 30,000 in 1939 and 126,500 in 1938. The total collection is the best since trout eggs were first taken at Lindloff in 1937. On November 17, River Philip camp supplied 1,093,400 Atlantic salmon eggs. Distributions for the season amounted to 683,900 Atlantic salmon and 730,700 speckled trout of which the following speckled trout were marked by the removal of the adipose and left pectoral fins—7,000 fingerlings, 2,089 yearlings and 167 two-year olds.

An experiment in feeding speckled trout fingerlings June 10 to September 8 was conducted with the following diets:—(1) 100 per cent liver, (2) 50 per cent liver plus 50 per cent hog plucks, (3) 100 per cent hog plucks, (4) 50 per cent liver plus 50 per cent whitefish meal, (5) 50 per cent plucks plus 50 per cent fish meal, (6) 50 per cent liver plus 50 per cent salmon egg meal, (7) 50 per cent salmon egg meal plus 50 per cent hog plucks. The smallest loss during the period was with diet 2, and the greatest increase in length and weight per fish was with diet 5. The least cost of producing a pound of trout was with diet 7. Another experiment with Atlantic salmon fingerlings June 10 to September 8 was carried out using diets:—(1) 100 per cent liver, (2) 50 per cent hog plucks plus 50 per cent liver, (3) 100 per cent hog plucks, (4) 50 per cent hog plucks plus 50 per cent whitefish meal, (5) 50 per cent liver plus 50 per cent whitefish meal. The least loss for the period was with diet 1 and the greatest increase in weight per fish was with diet 5, but with diet 4 a close second. The most economical food from the standpoint of cost of producing 1 pound of salmon was diet 4.

With a view to promoting selective breeding the eggs from eleven individual pairs of the best specimens available in the two-year old speckled trout were segregated. They all averaged over 2,000 eggs per fish. A noticeable improvement in fishing conditions is reported in several waters. Grounds were improved and a garage 12 feet by 20 feet erected.

MARGAREE HATCHERY

W. D. Turnbull, Superintendent

The hatchery ponds produced 3,086,700 speckled trout eggs this season and these were supplemented by receipt of 2,037,800 Atlantic salmon eggs from the Margaree salmon pond. Outgoing shipments in February and March were 1,000,000 speckled trout eggs to Lindlof, and in April 1,000,000 Atlantic salmon ova to Antigonish, 400,000 to Middleton and 300,000 to Yarmouth. Distributions consisted of 2,504,200 Atlantic salmon and 1,495,300 speckled trout including 29,718 salmon fingerlings marked by the removal of the adipose and right pectoral fins, and 12,712 trout fingerlings, 1, 2, 3, 4 and five-year-olds similarly marked.

An experiment to compare results as between parent four-year old speckled trout deprived of food from July 1 to spawning time 1939, and those fed regularly, was conducted. The females not fed averaged 712 eggs, with an egg loss of 19.2 per cent and an egg survival to hatch of 575, as against a corresponding record for those fed regularly of per female yield 1,069, percentage loss 11.3 and egg survival 948. An experiment with Lugol's solution maintaining a control group to compare the growths and losses was started in a pond divided by a double screen of galvanized netting. The experiment, however, was discontinued when holes were found in the screen due to deterioration of the netting. During the winter of 1938-39 one group of yearling speckled trout were not given any artificial food from December 20 to April 15 following. This group lost 16 per cent of their original weight; while another group of the same number and age retained under similar conditions, but fed in the usual way increased their weight by 26 per cent during the same period. All were then fed as usual from April 15, 1939, to May 15, 1940, at which time six of those fed as usual weighed 8 pounds, whereas a similar number of those not fed during the winter of 1938-39 weighed only 5½ pounds. All groups of salmon and trout were given preventive treatments weekly by dipping and the constant flow syphon, using copper sulphate, acetic acid and salt. Formaldehyde treatment was tried out and found very effective for Costia.

DEPARTMENT OF FISHERIES

MARGAREE SALMON-RETAINING POND

J. P. Chiasson, Superintendent

In accordance with the usual practice, the salmon for the Margaree Salmon Retaining Pond were purchased from the Margaree Harbour Salmon Fisheries Association. The Department endeavours to have the Association's net at Margaree Harbour operated in such a way as to permit of a reasonable distribution of the salmon that enter the river late in the season, between the Association and the anglers, and at the same time to assure of a fairly adequate number of adult salmon being secured for stripping and subsequent stocking of the Margaree River and neighbouring streams.

Preparations for taking fish began September 23, the pond was cleaned, gates repaired and wire enclosure fence erected. The Association's net was put in commission on October 1 and operated continuously until November 20. All the salmon taken during that period, a total of 298 only, averaging 11.4 pounds each, were impounded. Two million, thirty-seven thousand, eight hundred eggs were secured between November 14 and December 3 and laid down in the Margaree hatchery. Only six salmon were lost during operations beginning with the impounding of the first salmon on October 1 and the liberation of the last fish on December 6. The weather conditions were bad during the season with wind, snow and storms and the pond was at one time covered with as much as five inches of ice. Two hundred and ninety-one salmon were marked by attaching numbered aluminum tags to their dorsal fins.

MERSEY RIVER REARING PONDS

T. K. Lydon, Officer-in-Charge

Two hundred thousand Atlantic salmon advanced fry were transferred between June 3 and 8, from Nictaux to the Mersey River rearing ponds, and 111,600 vigorous, healthy fingerlings were distributed in September in the Mersey River below the ponds. The fingerlings grew well during the summer. Fifteen to twenty per cent were five inches or more in length when they were distributed.

MIDDLETON HATCHERY, STEVENS PONDS AND NICTAUX REARING STATION

F. M. Millett, Superintendent

In the early part of the year the following shipments of eyed eggs were received: January 2 to February 8, 800,000 speckled trout, purchased from Gilbert Trout hatchery, Massachusetts, U.S.A.; March 14, 100,000 salmon trout from Glenora hatchery, Ontario (an exchange for Atlantic salmon eggs); March 3, 698,700 Atlantic salmon from Nictaux; March 15, 200,000 speckled trout from Antigonish, and April 3, 400,000 Atlantic salmon from Margaree. In November 1,060,000 Atlantic salmon green eggs were received from River Philip pond. Outgoing shipments of Atlantic salmon eyed eggs were: March 4, 440,000 to Bedford and April 15, 397,000 to Nictaux. The shipment to Bedford was made necessary on account of temporary shortage of water at Middleton.

Distributions for the season were:—Atlantic salmon 437,000; salmon trout 63,000 and speckled trout 894,000, including 5,000 Atlantic salmon and 6,000 speckled trout fingerlings marked by the removal of the adipose and left ventral fins. The concrete headworks built at Stevens ponds in 1939 gave excellent results. A small building was erected at the hatchery to protect the deep well pump. Some very favourable reports were received on improved fishing in the district. The Fish, Forest and Game Associations again were much interested in the waters being stocked from this hatchery and the fishery inspectors, in many cases, have given valuable assistance in liberating the output.

The Nictaux rearing station was opened on February 27 and the first eggs, 700,000 Atlantic salmon from Kelly's pond hatchery were laid down on the twenty-ninth, but these, minus a small loss, were moved to Middleton on March 3 due to the water supply having been cut off, and the plant was closed until April when it was opened again on the fifteenth to receive 397,000 Atlantic salmon eggs from Middleton. Between June 3 and 8, 200,000 Atlantic salmon advanced fry were transferred to Mersey rearing station. The distribution from Nictaux was made on June 17 with an output of 133,000 salmon for the season. The Avon River power company again co-operated by placing the screen at the head of the canal before any smolt had descended the river and it was left in place until the run of smolts had passed.

YARMOUTH HATCHERY

H. V. Gates, Superintendent

The hatchery ponds this year produced 145,000 rainbow trout, 8,000 Kamloops and 49,000 speckled trout eggs. On April 4, 300,000 Atlantic salmon eggs were received from Margaree hatchery. Outgoing shipments for the season were: June 28 to Coldbrook 40,000 rainbow fingerlings and May 11 to Kejimikujik 100,000 speckled trout advanced fry. Distributions consisted of 244,000 Atlantic salmon, 125 Kamloops, 25,000 rainbow and 918,000 speckled trout. Of these 16,600 speckled trout fingerlings were marked by removal of the adipose and right ventral fins. Preliminary tests were made with cod liver residue fed to trout fingerlings and adults, alone and in combination with liver, and indications were that it could be used satisfactorily. High water temperatures prevailed this year again (78 to 81 degrees) and caused considerable loss in the speckled trout fingerlings. Low water conditions also obtained over the whole area served by this hatchery. The trap-net was again operated at Lake Annis for the capture of enemy fish and 1,383 were removed by this method. The officers of the administrative branch rendered much valuable assistance as well as the game associations, sportsmen and private citizens. The dwelling was improved during the year by construction of a new verandah.

CHARLO HATCHERY

R. O. Barrett, Superintendent

In March, 198,200 speckled trout eyed eggs were received from Florenceville hatchery and in April, 11,800 Atlantic salmon eyed eggs from Gaspé hatchery, Quebec, in exchange for a similar number of salmon eggs to compare the growth under similar conditions of fry and fingerlings from the two localities. The New Mills salmon fingerlings averaged 3 inches in length and the Gaspé fingerlings $2\frac{1}{2}$ inches on October 3. Two million, five hundred and twenty-seven thousand, eight hundred Atlantic salmon eggs were received from New Mills salmon retaining pond in October and November and 1,000,500 from the previous autumn collection were transferred (eyed) to the Grand Falls hatchery during April. Distributions for the season amounted to 1,620,400 Atlantic salmon and 86,000 speckled trout.

During the year 64 V type pond shades were made, the grounds and 16 circular and 1 brood pond were improved.

Speaking of the Restigouche River in 1940 an old resident writes "From my many years of observation I have never seen so many grilse in the river as last year. The branches were full of them and I do not remember seeing them come into the river at so early a date as last year. As regards parr, they were also very plentiful." Members of the Restigouche Salmon Club state that they took seven times more grilse during the season than has been known for at least twenty years.

FLORENCEVILLE HATCHERY

George Sutherland, Superintendent

Movements of eyed eggs in March and April consisted of 1,300,000 Atlantic salmon from Miramichi and 10,000 speckled trout from Antigonish hatchery with 189,200 speckled trout sent to Charlo and 697,500 of the same species to Grand Falls hatchery. In the fall 41,200 sebago salmon eggs were secured from Clinch brook and 2,077,900 speckled trout from the hatchery ponds. Distribution of output for the year was 1,237,800 Atlantic salmon and 922,300 speckled trout, of which 36,714 speckled trout 1, 2, 3, 4 and 5 years old were marked by removal of the adipose and left pectoral fins.

An experiment was conducted in feeding speckled trout fingerlings from July 1 to August 31 as follows: Diet (1) 100 per cent liver, (2) 90 per cent liver plus 10 per cent fish meal, (3) 80 per cent liver plus 20 per cent fish meal. The least loss was with diet 2 but the greatest increase in weight per fish was with diet 1. Another experiment was started in 1939 to compare results as between parent three-year old speckled trout deprived of food from July 15 to spawning time and those fed regularly. In those not fed the yield per female was 438, the per cent loss in eggs until hatched in 1940 was 14.8 and eggs per female that survived to hatch 373; in those parents fed regularly, the corresponding figures were 689, 14.5 per cent and 589. The Fredericton branch of the New Brunswick Fish and Game Association as usual rendered valuable assistance with the distribution of fish in their district.

Repairs were made to the supply dam and a new gate installed in it. The hatchery was given a new roofing.

GRAND FALLS HATCHERY

W. A. McCluskey, Superintendent

This establishment received the following eggs: In March and April 697,500 speckled trout from Florenceville and 1,000,500 Atlantic salmon from Charlo hatchery, and in the autumn 890,400 speckled trout from Fraser's pond, Three Brooks. Distributions for the season were, Atlantic salmon 1,748,000 and speckled trout 784,100. Four hundred and ninety-six speckled trout yearlings reared at Florenceville hatchery were marked by removal of the adipose and both ventral fins before being distributed from the Grand Falls establishment.

The Grand Falls, St. Leonard, St. Anne de Madawaska and Madawaska Fish and Game Clubs gave good assistance in the planting of output from this hatchery. Nine V type screens were made for the circular ponds.

MIRAMICHI SALMON-RETAINING POND AND HATCHERY

Frank Burgess, Superintendent

As usual the adult fish for the retaining pond were secured by public tender and contract. One thousand five hundred and twenty-four salmon, averaging 8.5 pounds each, were captured in trap or pound nets which were fished continuously from September 9 to 15 and September 21 to October 15. All fish taken, however, were not available for stripping as some 423 escaped when the fences were flooded due to a severe freshet in September. The eggs, 5,513,500 in number, were secured between October 19 and November 12, and all were laid down for incubation in Miramichi hatchery. One marked fish (Newfoundland) was taken in the pond and released again after stripping with the same tag attached. It weighed $17\frac{1}{2}$ pounds before and $14\frac{1}{2}$ pounds after stripping.

On November 7 and 14 some 40,800 sea-run speckled trout eggs were laid down in this hatchery from Tweedie's Meadow brook. In March and April 1,800,000 Atlantic salmon eggs were shipped out, 500,000 to Saint John and 1,300,000 to Florenceville hatchery. Distributions for the season were, Atlantic salmon 3,170,200 and speckled trout 57,000.

Maple trees were planted, swamp land filled in and the grounds improved generally.

NEW MILLS SALMON-RETAINING POND

William White, Superintendent

Between May 22 and July 16, 500 salmon of the early run were purchased from the commercial fishermen of the district. They averaged 15.1 pounds in weight and yielded at stripping time, October 22 to November 13, 1,931,000 ova, all of which were laid down in Charlo hatchery. A further collection of late run salmon was made from a trap operated at Jacquet River. Here 237 salmon averaging 6 pounds in weight were taken, September 2 to October 16, and towed to New Mills pond where they yielded 596,800 eggs. All eggs were transferred to the Charlo hatchery.

SAINT JOHN HATCHERY, SAINT JOHN SALMON-RETAINING POND AND CHAMCOOK LAKES EGG-COLLECTING STATION

J. D. Nichol, Superintendent

P. B. Stratton, Hatchery Assistant

Eggs secured from fish retained in the hatchery ponds amounted to 113,900 rainbow trout and 1,575,800 speckled trout. On March 8, some 500,000 Atlantic salmon eggs were received from Miramichi hatchery and in the fall the following eggs, 974,400 salmon from the Saint John pond, 54,200 sebago from Chamcook Lakes camp, 256,300 speckled trout from Spears brook and 36,600 of the same species from Trout brook. In March, 25,000 Atlantic salmon eggs were shipped to Sault Sainte Marie hatchery and a similar quantity to Glenora hatchery, Ontario. These two shipments were on account of an exchange with the Provincial Department of Game and Fisheries, Toronto, for salmon trout eggs. On May 22 rainbow trout ova amounting to 101,300 were sent to Kelly's pond hatchery. Distributions for the season were, Atlantic salmon 622,500, speckled trout 824,000, rainbow trout 63 and sebago salmon 2,653. All the rainbow, sebago and 420 of the speckled trout were marked before being planted by removal of the adipose and one other fin. These marked fish were 1, 3, 4 and 6 years of age. Allotments for experimental study included 7,100 Atlantic salmon and speckled trout eggs to Doctor K. C. Fisher, Toronto, and 100 speckled trout in different stages of development from eggs to five-year old fish to the Atlantic Biological Station at Saint Andrews, N.B. Some 2,400 Atlantic salmon eyed eggs were also supplied at the request of the New Brunswick Government Bureau of Information and Tourist Travel in connection with the Sportsmen's show in New York in February.

Superintendent J. D. Nichol reached the superannuation age on March 17 and was replaced, pending a permanent appointment by Hatchery Assistant P. B. Stratton.

Several experiments were tried with satisfactory results using formalin as a disinfectant and curative for fin and gill rot in concentrations of 1:1,250, 1:2,000, 1:2,500, and 1:4,000. An experiment was conducted to compare the yield in the second year as between speckled trout stripped and not stripped as yearlings. Those not stripped when one year old yielded 469 eggs per female and showed a percentage loss in eggs to hatch of 23.3. Those stripped at one

year and again at two years of age yielded in the second year 607 eggs per female and showed a percentage loss to hatch of 24.4. In another experiment results were compared as between two-year parent speckled trout deprived of food from August 31, 1939, to stripping time and those fed regularly up to two weeks before stripping. Those not fed yielded 490 eggs per female, had a percentage loss in eggs to hatch of 42.2 and showed the eggs per female survival to hatch of 283. Those fed normally showed corresponding figures of 624, 28.5 per cent and 446. When the brood stock was being sorted early in the spring goitre appeared to be quite prevalent. Lugol's solution incorporated in the food was resorted to throughout the early summer, but later on when these fish were being fed largely on a fish diet which was thought to contain a sufficient iodine content the solution was discontinued. When handling these fish for stripping in the fall thyroid growth appeared to be absent except in one or two cases.

The road leading from the highway to the hatchery was gravelled and several improvements to grounds and buildings effected. Members of the New Brunswick Fish and Game Protective Association gave valuable assistance with distributions in their respective localities and this was particularly the case with the Saint John branch.

The Saint John salmon-retaining pond was fitted up in May, repairs made where necessary and everything placed in readiness for the 259 salmon which were received from the commercial fishermen between June 15 and August 16. They averaged 9.4 pounds each and between October 28 and November 7 supplied 978,600 eggs, all of which were laid down in the Saint John hatchery, except 4,255 sent Doctor K. C. Fisher, of Toronto, for experimental study.

Conditions at this pond are far from satisfactory. The fishermen are not supplying the numbers of fish expected. These numbers have dropped gradually from 1,334 in 1936, to 259 this year. Overhead expenses are costly, losses of parent fish during retention are heavy and the temperature rise is high. This year a dredge was working out in the bay and whenever the tide did come into the pond it usually brought in a heavy deposit of silt which cannot be considered beneficial to the fish. Taking everything into consideration it would appear that this pond has about outlived its usefulness and steps are being taken to close it and to secure the Saint John hatchery allotment of eggs in future from other points.

The collection of sebago salmon eggs at Chamcook Lakes was under the direction of Assistant T. K. Lydon of Saint John hatchery. He operated a trap net from October 23 to November 19 and secured 105 fish, averaging 2.4 lbs., from which from November 9 to 21 were obtained 54,600 eggs, all of which were laid down in the Saint John hatchery except a small shipment for the Saint Andrews Biological Station. Difficulty was experienced in trapping in that fairly low water obtained until the week ended November 16 and extremely high water thereafter. Males predominated over the females in number as shown by the catch, 62 males and only 43 females. This condition is directly opposite to what it was last year when females exceeded the males in number. Thirty-four of the 105 fish handled in 1940 or 32.4 per cent, had clipped fins, having been marked in this way before they were distributed.

CARDIGAN REARING PONDS

C. A. Tait, Superintendent

Preparatory work in connection with the ponds was commenced on May 13 to have them in readiness for 598,500 speckled trout and 85,800 rainbow trout advanced fry which arrived between May 23 and June 24 from Kelly's pond

hatchery. The output for the season was 82,000 rainbow and 537,000 speckled trout, which included 10,000 speckled trout No. 4 fingerlings marked by removal of the adipose and left pectoral fins. A nutritional test with speckled trout fingerlings was conducted in troughs from August 27 to October 19, feeding the following diets: (1) One hundred per cent liver, (2) sixty per cent liver plus forty per cent Silver Fur Food. Diet 2 produced the least loss for the period, but diet 1 afforded the greatest increase in weight and length per fish.

Twenty-four V type shades were made for the ponds and the grounds improved generally during the year.

KELLY'S POND HATCHERY AND MORELL RIVER SALMON-RETAINING POND

F. C. Hayley and C. A. Tait, Superintendents

As Superintendent F. C. Hayley had reached the superannuation age on March 29, he was replaced by Superintendent C. A. Tait of the Cardigan rearing station.

Local collections of speckled trout eggs made in the fall amounted to 24,700 from the hatchery pond and 3,700 of the sea-run variety from Fortune River. These collections were supplemented by 2,107,300 Atlantic salmon eggs from Morell pond and 191,900 speckled trout ova from Andrews and York ponds. Transfers from February to June were 101,300 rainbow trout from Saint John, 800,000 speckled trout from Antigonish, 700,000 Atlantic salmon to Nictaux, 85,800 rainbow and 598,500 speckled trout to Cardigan rearing ponds. Distributions for the year were Atlantic salmon 316,800 and speckled trout 148,000.

A cement foundation was placed under the hatchery dwelling, the cellar considerably enlarged and a furnace and electric pump installed. Six new troughs were built, repairs made to trough supports and to the inside wall at the east end of the hatchery. A new ramp to the upper floor was built, new floor laid upstairs in the hatchery and stay rods placed to strengthen the walls of the building.

At Morell salmon pond, Assistant C. Sayer was in charge. Between October 12 and November 18, 563 salmon were caught in the trap-net. They averaged nine pounds and when stripped November 12 to December 2 yielded 2,107,300 eggs, all of which were laid down in Kelly's Pond hatchery. This is the largest collection at Morell since 1937.

The run of salmon was reported better than the average for the last three years. The 1940 season was very stormy, with blizzards and very cold weather. A new pile-driver frame was built.

STATEMENT BY SPECIES, OF LOCAL COLLECTION AND DISPOSAL OF EGGS DURING 1940

Species	Collection area	First and last eggs	Number collected	Disposal—Establishment at	Number	Totals
Atlantic salmon.....	Margaree pond, N.S. River Philip, N.S.	Nov. 14-Dec. 3... Nov. 5-16.....	2,037,800 7,337,790	Margaree..... Cobequid..... Bedford..... Lindloff..... Middleton..... Bedford..... Miramichi..... Charlo..... St. John..... Dr. K. C. Fisher, University of To- ronto, Toronto, Ontario.	2,037,800 3,019,390 2,165,000 1,093,400 1,060,000 635,700 5,513,521 1,931,023 596,799 974,395	
	Sackville River, N.S. Miramichi pond, N.B. New Mills pond (Chaleur Bay) N.B. New Mills pond (Jacquet River) N.B. St. John pond, N.B.	Nov. 4-16..... Oct. 19-Nov. 12.. Oct. 22-Nov. 13.. Oct. 16-Nov. 13.. Oct. 28-Nov. 7...	635,700 5,513,521 1,931,023 596,799 978,650			
Kamloops trout..... Sebago salmon.....	Morell River, P.E.I. Yarmouth hatchery ponds, N.S. Grand Lake, N.S. Grand Lake rearing ponds, N.S. Chamcook Lakes, N.E.	Nov. 12-Dec. 2... Apr. 25..... Nov. 10-25..... Nov. 18..... Nov. 9-21.....	2,107,300 8,000 43,500 16,500 54,610	Kelly's pond..... Yarmouth..... Grand Lake..... Grand Lake..... St. John..... Atlantic Biological Station, St. An- drews, N.B.	4,255 2,107,300 8,000 43,500 16,500 54,250	21,138,583 8,000
Rainbow trout.....	Clinch brook, York County, N.B. Antigonish hatchery ponds, N.S. Yarmouth hatchery ponds, N.S. St. John hatchery ponds, N.B. Anderson Lake, P.C. Antigonish hatchery ponds, N.S.	Nov. 8-15..... Mar. 30-Apr. 26.. Apr. 2-May 2..... Apr. 26-May 9... Oct. 24-31..... Oct. 12-Dec. 21..	41,194 280,000 145,000 113,875 980,000 (a) 12,829,290	Florenceville..... Antigonish..... Yarmouth..... St. John..... Anderson Lake..... Antigonish.....	360 41,194 280,000 145,000 113,875 980,000	155,804
Sockeye salmon..... Speckled trout.....	Cobequid hatchery ponds, N.S. Lindloff hatchery ponds, N.S. Lindloff Lake, N.S. McRae Lake, Richmond County, N.S. Margaree hatchery ponds, N.S. Yarmouth hatchery ponds, N.S.	Oct. 17-Dec. 19.. Oct. 15-Dec. 16.. Oct. 13-19..... Oct. 3-11..... Oct. 18-Dec. 21.. Oct. 25-Nov. 8...	(a) 1,516,794 81,509 (a) 436,883 15,709 169,974 2,347,945 (a) 738,720 (a) 40,000 9,000	Cobequid..... Lindloff..... Lindloff..... Lindloff..... Margaree..... Yarmouth.....	22,026,020 1,852,095 518,392 15,709 169,974 3,086,665 49,000	538,875 980,000

Florenceville hatchery ponds, N.B.		Oct. 8-Dec. 18....	1,904,818	Florenceville.....		2,077,886
St. John hatchery ponds, N.B.		(a) Oct. 17-Dec. 11..	173,068	St. John.....		1,575,796
Spears brook, Charlotte County, N.B.		(a) Oct. 12-Nov. 12..	1,470,333	St. John.....		256,260
Trout brook, Charlotte County, N.B.		Oct. 12-Nov. 12..	105,463	Miramichi.....		36,624
Tweedie's Meadow brook, Kent County, N.B.		Nov. 7, 14.....	256,260	Kelly's pond.....		40,782
Fortune River, P.E.I.		(b) Nov. 25.....	36,624	Kelly's pond.....		3,740
Kelly's pond hatchery pond, P.E.I.		(a) Nov. 23-Dec. 26..	40,782	Kelly's pond.....		24,660
			3,740			31,733,603
			24,660			54,554,865

(a) Eggs from yearling fish.
(b) Sea run variety.

EYED EGGS PURCHASED IN 1940

Species	Month laid down	Purchased from	Laid down in hatchery	Number paid for	Total by species
Speckled trout.....	January, February.....	Gilbert Trout Hatchery, Plymouth, Mass.....	Middleton.....	786,200	1,614,555
	October, November.....	Donald Fraser Estate, Plaster Rock, N.B.....	Grand Falls.....	657,000	
	November, December.....	Harold Watts, York, P.E.I.....	Kelly's Pond.....	171,355	

Summary of eggs received: Eggs collected 54,554,865; Eggs purchased 1,614,555; Total 56,169,420.

EXCHANGED EYED EGGS RECEIVED 1940

From Department of Game and Fisheries, Toronto, Ontario, in exchange for Atlantic salmon:—	
Salmon trout from Glenora fish hatchery, laid down at Middleton hatchery.....	100,000
From Department of Lands and Forests, Game and Fisheries, Quebec, in exchange for Atlantic salmon:—	
Atlantic salmon from Gaspé hatchery, laid down at Charlo hatchery.....	11,840

In the interest of economy and convenience in distribution the following transfers were made in 1940:—

Species	Stage	From	To	Number	Date received
Atlantic salmon...	(d)	(a) Bedford.....	Grand Lake.....	181,700	May 8-June 14
	(e)	(a) Bedford.....	Grand Lake.....	500,711	June 21-July 12
	(d)	(a) Bedford.....	Kejimikujik.....	300,000	June 8-17
	(c)	(a) Margaree.....	Antigonish.....	1,000,000	April 12
	(c)	(a) Margaree.....	Middleton.....	400,000	April 3
	(c)	(a) Margaree.....	Yarmouth.....	300,000	April 4
	(c)	(a) Middleton.....	Bedford.....	440,000	March 4
	(c)	(a) Middleton.....	Nictaux.....	397,000	April 15
	(d)	(a) Nictaux.....	Mersey.....	200,000	June 3-8
	(c)	(a) Nictaux.....	Middleton.....	698,700	March 3
	(c)	(a) Charlo.....	Grand Falls.....	1,000,456	April 26
	(c)	(a) Miramichi.....	Florenceville.....	1,300,000	April 5
	(c)	(a) Miramichi.....	St. John.....	500,000	March 8
	(c)	(a) Kelly's Pond.....	Nictaux.....	700,000	February 29
	(e)	(b) Yarmouth.....	Coldbrook.....	40,000	June 28
	(c)	(b) St. John.....	Kelly's Pond.....	101,276	May 23
Rainbow trout....	(d)	(b) Kelly's Pond.....	Cardigan.....	85,845	June 22, 24
	(c)	(a) Antigonish.....	Bedford.....	1,200,000	March 15
	(c)	(a) Antigonish.....	Cobequid.....	1,000,000	March 12
Speckled trout....	(c)	(a) Antigonish.....	Middleton.....	200,000	March 15
	(c)	(a) Antigonish.....	Florenceville.....	10,000	March 13
	(c)	(a) Antigonish.....	Kelly's Pond.....	800,000	March 12
	(d)	(a) Bedford.....	Coldbrook.....	390,586	May 25-June 4
	(f)	(a) Cobequid.....	Grand Lake.....	5,400	Oct. 2-Dec. 9
	(c)	(a) Margaree.....	Lindloff.....	1,000,000	Feb. 17-March 2
	(d)	(a) Yarmouth.....	Kejimikujik.....	100,000	May 11
	(c)	(a) Florenceville.....	Charlo.....	198,240	March 15
	(c)	(a) Florenceville.....	Grand Falls.....	697,500	March 13
	(d)	(a) Kelly's Pond.....	Cardigan.....	598,516	May 23-June 3

(a) 1939 fall collection.
(f) yearlings.

(b) 1940 collection.

(c) eyed eggs.

(d) fry.

(e) fingerlings.

TAGGING AND MARKING OF FISH

The tagging of Atlantic salmon, which was commenced in 1913, was continued in 1940, as shown in table No. 1, in the St. Mary River by Mr. Albert E. S. Whittaker and at the Margaree and River Philip salmon retaining ponds by the department. The adipose and one of the side fins were removed from 215,612 Atlantic and landlocked salmon, rainbow and speckled trout before they were distributed. The object of the tagging is to add to existing information in regard to the movements of the fish, frequency in spawning and the extent to which "early" salmon of any year may return to fresh water as "early" fish or as "late" fish. The marking or fin clipping is for the purpose of gaining further information in regard to the movements, growth and survival of hatchery product.

The recaptures of clean salmon (tagged in most cases as kelt after they were stripped and had spent one or more seasons in the sea) that were reported up to December 31, 1938, were summarized in the Annual Report on Fish Culture for that year. Eighty-eight more were reported in 1939 and 1940. Recaptures reported up to December 31, 1940, constituted 2.71 per cent of the total number tagged from 1913 to 1939 inclusive. The recaptures in 1940 are shown in table No. 2. The recaptures of salmon tagged at different points, that have been reported, range from nil from the Tabusintac River to 5.63 per cent from the Margaree River tagging. The respective percentages are shown in table No. 3. One hundred and eighty-two or 37.5 per cent of the total recaptures were taken within one year; 295 or 60.7 per cent within two years; 4 or .8 per cent

within three years; 4 or .8 per cent within four years and one salmon or .2 per cent within five years of the date on which they were tagged and liberated. The fifth year fish was tagged at the Margaree Harbour pond and recaptured at La Pointe, Inverness County, N.S.

The extent of the fin clipping and the recaptures of fin clipped fish that were reported in 1940 are shown in tables No. 4 and 5, respectively. The percentage of these marked fish that have been reported from the different districts varies greatly in relation to the number that were marked in this way. Apparently the anglers and residents of some districts are not prepared to co-operate to the extent of reporting the taking of marked fish by postcards provided by the Department or by reporting verbally to the nearest fishery officer, although at the same time they do not hesitate to complain if the angling is not as good as it used to be when the fishing effort was only a fraction of what it is at the present time.

TABLE No. 1.—ADULT ATLANTIC SALMON, TAGGED BY AFFIXING ALUMINUM TAGS TO THE DORSAL FIN, 1940

—	Number tagged	Period of tagging	Where liberated
<i>Nova Scotia</i> —			
St. Mary River, Guysborough Co..	3(a)	July 16, 17, 19.....	St. Mary River.
Margaree pond.....	291	Nov. 19-Dec. 5.....	Margaree Harbour.
River Philip pond.....	500	Dec. 6-14.....	River Philip.

(a) These 3 grilse were tagged by Mr. Albert E. S. Whittaker at Stillwater pool.

TABLE No. 2.—RECAPTURES, 1940—ATLANTIC SALMON
MARGAREE RIVER, N.S.

Number	Weight (pounds)	Length (inches)	Condition	Sex	Date	1. Where liberated 2. Where caught
K153	(d)	.....	.....	.....	Oct. 3, 1938	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	22	36	Clean.....	.....	July 5, 1940	La Pointe, Inverness County, N.S.
K218	(d)	.....	.....	.....	Oct. 3, 1938	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	19	36 1/6	Clean.....	.....	July 15, 1940	Margaree River, at Black Rock, N.S.
K220	(d)	.....	.....	.....	Oct. 3, 1938	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	(v) 20	.....	Clean.....	.....	Aug. 26, 1940	Ross Pool, Margaree River, N.S.
K305	(d)	.....	.....	.....	Oct. 4, 1938	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	(w)(aa) 15	.....	Clean.....	.....	Summer 1939	Charge Du Lac Point, La Tabatiere, Que.
K1756	(d)	.....	.....	M	Sept. 28, 1939	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	(w)	.....	Clean.....	M	Oct. 1939	Margaree River, at Margaree Forks, N.S.
K1770	(d)	.....	.....	F	Sept. 29, 1939	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	(z) (u) 11	35	Clean.....	F	..... 1940	(a) Margaree Pond, N.S.

TABLE No. 2.—RECAPTURES, 1940—ATLANTIC SALMON—*Continued*MARGAREE RIVER, N.S.—*Concluded*

Number	Weight (pounds)	Length (inches)	Condition	Sex	Date	1. Where liberated 2. Where caught
K1792	(d)	.....	.....	F	Sept. 30, 1939	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	(w)	.....	Clean.....	F	Oct. 1939	Margaree River, at Margaree Forks, N.S.
K1816	(d)	.....	.....	F	Oct. 3, 1939	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	15	29	Kelt.....	F	May 15, 1940	Margaree Harbour, N.S.
K1854	(d)	.....	.....	M	Oct. 8, 1939	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	(v) 8	31	Kelt.....	M	May 11, 1940	Hart Pool, Margaree River, N.S.

RIVER PHILIP, N.S.

K1117	7 9	30	Kelt..... Clean.....	F F	Nov. 13, 1939 July 22, 1940	River Philip Pond, N.S. Fishing Ships Harbour, Labrador.
K1174	13	34	Kelt..... Kelt.....	F F	Nov. 15, 1939 June 20, 1940	River Philip Pond, N.S. Friar Head, Inverness County, N.S.
K1361	13½ (z) (u) 14	33 36	Kelt..... Clean.....	F F	Nov. 10, 1938 1940	(c) River Philip Pond, N.S. River Philip Pond, N.S.
K1368	16½ 26	36 41½	Kelt..... Clean.....	F F	Nov. 10, 1938 June 22, 1940	River Philip Pond, N.S. George Bay, at Morristown, Antigonish County, N.S.
K1635	14 (z) (u) 13	34 37	Kelt..... Clean.....	F F	Nov. 13, 1938 1940	(c) River Philip Pond, N.S. River Philip Pond, N.S.
K2491	7	29½	Kelt..... Kelt.....	M M	Nov. 17, 1939 April 16, 1940	River Philip Pond, N.S. River Philip District, N.S.

MIRAMICHI RIVER, N.B.

105	9½ 14½	31 39½	Kelt..... Kelt.....	F F	Oct. 27, 1937 May 22, 1940	Miramichi Pond, N.B. Northwest Miramichi River, above Redbank Bridge, N.B.
618	10 11½	29½ 36	Kelt..... Kelt.....	F F	Nov. 2, 1937 May 27, 1940	Miramichi Pond, N.B. Miramichi River (north side) opposite Loggieville, N.B.

NEW MILLS POND, N.B.

K2642	6½ 11½	28	Kelt..... Clean.....	M M	Nov. 1, 1939 July 22, 1940	New Mills Pond, N.B. At Cooper Head, near south entrance to Squash's Run, Tub Harbour (near Venison Islands) Labrador.
K2688	6½	30½	Kelt..... Clean.....	M M	Nov. 1, 1939 June 4, 1940	New Mills Pond, N.B. Chaleur Bay, at Miguasha West, Que.

TABLE No. 2.—RECAPTURES, 1940—ATLANTIC SALMON—*Concluded*

ST. JOHN RIVER, N.B.

Number	Weight (pounds)	Length (inches)	Condition	Sex	Date	1. Where liberated 2. Where caught
K423	9½ 17	32½	Kelt..... Clean.....	F F	Nov. 7, 1938 June 28, 1940	St. John Pond, N.B. Bay of Fundy, three miles south of Negro Head, N.B.
K582	10 19	32 38	Kelt..... Clean.....	F F	Nov. 11, 1938 1940	St. John Pond, N.B. Bay of Fundy, two miles off Musquash, N.B.
K640	9 17	32 37½	Kelt..... Clean.....	F F	Nov. 11, 1938 June 10, 1940	St. John Pond, N.B. Bay of Fundy, seven miles south by southeast of Dipper Har- bour, N.B.
K784	12	32 35	Kelt..... Clean.....	F F	Nov. 12, 1938 April 28, 1940	St. John Pond, N.B. Nashwaak River, at Clark's Island, above Marysville, N.B.
K834	12 20½	33	Kelt..... Clean.....	F F	Nov. 12, 1938 June 27, 1940	St. John Pond, N.B. St. John Harbour, near Navy Island, N.B.

(aa) Estimated dressed weight.

(a) Caught for second time for fish cultural purposes, Oct. 1-Nov. 14, 1940.

(c) Caught for second time for fish cultural purposes, Sept. 23-Nov. 6, 1940.

(d) Tagged and liberated without weighing or measuring, etc.

(u) Liberated with same tag attached.

(v) Weight estimated.

(w) Reported in 1940.

(z) Weight after stripped.

TABLE No. 3.—PERCENTAGE RECAPTURES OF CLEAN SALMON TAGGED AND
LIBERATED FROM THE SEVERAL POINTS, FROM 1913 TO 1939, INCLUSIVE

	Per Cent
Allen's Lake and Port Maitland, N.S.	1.89
Margaree River, N.S.	5.63
Nictaux River, N.S.	3.91
River Philip and Wallace River, N.S.	0.76
Sackville River, N.S.	4.23
Miramichi and Cains Rivers, N.B.	1.60
Tabusintac River, N.B.	Nil
Restigouche River and tributaries and New Mills, N.B.	1.27
Nipisiguit River, N.B.	1.37
St. John River, N.B.	2.18
Morell River, P.E.I.	2.80
Saguenay River, Tadoussac, P.Q.	2.34
York River, P.Q.	0.61

TABLE No. 4—FISH MARKED BY FIN CLIPPING, 1940

	Number marked fish distributed	Species	Age	Distributed	Nature of mark: Removal of
<i>Nona Scotia</i> — Antigonish hatchery					
	81	Rainbow trout.....	Five years.....	Apr. 27, 30—Giant Lake.....	Adipose and right pectoral
	3,500	Speckled trout.....	Yearlings.....	May 16, Nov. 28, Dec. 13—Calder Lake.....	"
	1,300	"	"	May 9, Nov. 27—Coosee Coffre Lake.....	"
	2,000	"	"	May 4, Nov. 7—Copper Lake, Antigonish County.....	"
	2,900	"	"	May 10, Dec. 17—Cutler Lake.....	"
	2,100	"	"	May 20, Nov. 7—Dewar dam, Barney River.....	"
	3,327	"	"	May 6, Nov. 21—Dobson Lake.....	"
	555	"	"	May 8, Nov. 22, Dec. 10—Donahue Lake.....	"
	1,200	"	"	May 21—Gaspereaux Lake.....	"
	1,200	"	"	Dec. 18—Hazel Hill Lake.....	"
	1,868	"	"	Dec. 10, 23—Jellow Lake.....	"
	1,600	"	"	May 4, Nov. 10—McLean or James River Lake.....	"
	1,200	"	"	Dec. 24—McMillan Lake.....	"
	500	"	"	May 21—North Lake.....	"
	1,300	"	"	Dec. 24—Pinevale Lake.....	"
	3,600	"	"	May 7, Dec. 11, 23—Sherbrook Lake.....	"
	3,000	"	"	May 11, Nov. 9, Dec. 13—Stewart dam, tributary to Little Harbour.....	"
	1,000	"	"	Dec. 16—Three Mile Lake.....	"
	898	"	"	Dec. 11—West River, Pictou County.....	"
	305	"	"	Dec. 10—Jellow Lake.....	"
	1,101	"	Two years.....	Dec. 10—West River, Antigonish County.....	"
	900	"	Three years.....	Nov. 27—Gaspereaux Lake.....	"
	399	"	"	Dec. 10—West River, Antigonish County.....	"
	123	"	"	Dec. 10—Donahue Lake.....	"
	27	"	Four years.....	Dec. 10—Jellow Lake.....	"
	302	"	"	Dec. 11—West River, Pictou County.....	"
	22,215	Atlantic salmon.....	Fingerlings.....	Sept. 3—Oct. 8—River Philip.....	Adipose and right ventral
	3,500	Speckled trout.....	Yearlings.....	June 27—Rolly Lake.....	"
	1,000	"	"	Aug. 5—Gilbert Lake.....	"
	600	"	"	Aug. 25—Irving Lake.....	"
	500	"	"	July 30—Leak Lake.....	"
	1,500	"	"	July 16—Long Lake—Tanamar River.....	"
	1,000	"	"	Aug. 6—McAloney Lake.....	"
	300	"	"	June 14—McLeod Lake.....	"
	600	"	"	Aug. 25—Rocky Lake.....	"
	1,695	"	"	July 9—Silver Lake or Morice Pond.....	"
	3,241	"	"	May 29, July 2—Simpson Lake.....	"
	3,500	"	"	May 30, June 28—Sutherland Lake.....	"
	600	"	"	Sept. 30—Turo Reservoir, Leper brook.....	"
Cobequid hatchery					

Grand Lake rearing ponds.	1				Adipose and left ventral " " Adipose and right ventral " " Adipose and left pectoral " " " " " " Adipose and right pectoral " " " " " "
		Quamaniche.....	Four years.....	Mar. 16—Grand Lake.....	
Lindloff hatchery.....	9,609	Sebago salmon.....	Two years.....	June 27 to Oct. 2—Grand Lake.....	Adipose and left ventral
	1,529	" "	Three years.....	Mar. 16 to Aug. 14—Grand Lake.....	Adipose and right ventral
	1,000	Speckled trout.....	Fingerlings.....	Nov. 2—Mary Ann's Lake.....	Adipose and left pectoral
	5,000	" "	" "	Oct. 30—Pottius Lake (Madame Island).....	" "
Margaree hatchery.....	2,089	" "	" "	Nov. 2—Thompson Lake.....	" "
	167	" "	Yearlings.....	May 8, Dec. 7—McIntyre Lake.....	" "
	29,718	Atlantic salmon.....	Two years.....	May 8, Dec. 7—McIntyre Lake.....	" "
	8,000	Speckled trout.....	Fingerlings.....	Sept. and Oct.—Northeast Margaree River.....	Adipose and right pectoral
	2,500	" "	" "	Dec. 10—Lake O'Law.....	" "
	308	" "	Yearlings.....	Dec. 10—Lake O'Law, upper.....	" "
	211	" "	Two years.....	Dec. 27—Lake O'Law.....	" "
	124	" "	Three years.....	Dec. 18—Lake O'Law.....	" "
Middleton hatchery.....	114	" "	Four years.....	Dec. 18—Lake O'Law.....	" "
	655	" "	Five years.....	Dec. 3—Plaster pond.....	" "
	5,000	Atlantic salmon.....	Fingerlings.....	Dec. 3—Lake O'Law.....	" "
	3,000	Speckled trout.....	" "	Sept. 26—Gaspereau River.....	Adipose and left ventral
Yarmouth hatchery.....	3,000	" "	" "	Sept. 20—Scrag Lake.....	" "
	6,000	" "	" "	Sept. 3—Spectacle Lake—Malgeak Lake.....	" "
	2,000	" "	" "	Nov. 13—Granite Lake.....	Adipose and right ventral
	5,600	" "	" "	Nov. 6—Granite Village brook.....	" "
New Brunswick— Florenceville hatchery.....	3,000	" "	" "	Oct. 31—Harris Lake.....	" "
				Nov. 6—Tigney brook.....	" "
	1,200	Speckled trout.....	Yearlings.....	Aug. 5, 8—Brown Lake.....	Adipose and left pectoral
	2,000	" "	" "	Aug. 14, 15, 17—Bulls creek—St. John River.....	" "
	1,600	" "	" "	Sept. 21, 23—Bull creek—Bel River.....	" "
	1,300	" "	" "	Aug. 15, 17—Cranberry Lake.....	" "
	1,200	" "	" "	Aug. 2, 6—Cross creek—Nashwaak River.....	" "
	1,500	" "	" "	Aug. 14, Sept. 17—Davidson Lake.....	" "
	2,400	" "	" "	Sept. 18, 24, 27—Second Bel Lake.....	" "
	1,200	" "	" "	July 29, Aug. 1—Gibson Mill brook, north branch.....	" "
	1,900	" "	" "	Aug. 29, Sept. 28—Big Guisguet River.....	" "
	2,753	" "	" "	Aug. 30, Sept. 18, 28—Little Guisguet River.....	" "
	600	" "	" "	Aug. 8—Hagerman brook—St. John River.....	" "
	600	" "	" "	Sept. 19—Lanes creek—St. John River.....	" "
	600	" "	" "	Aug. 13—Limekiln brook—Nashwaak River.....	" "
	600	" "	" "	Sept. 17—McLeary brook—Lakeville pond.....	" "
	900	" "	" "	Sept. 17—Maynes brook—Little Presquac River.....	" "
	1,200	" "	" "	Aug. 9, 16—Mill brook—Mactaquac River.....	" "
	1,200	" "	" "	Aug. 3, 7—Nashwaakis River.....	" "
	2,400	" "	" "	Aug. 1, Sept. 16, 25—Pokiok River.....	" "
	496	" "	" "	Nov. 25—Private pond, Power creek, Mr. Zeno Martin.....	Adipose and both ventrals
	1,600	" "	" "	Sept. 23, 28—River de Chute.....	Adipose and left pectoral
	3,000	" "	" "	Aug. 10, Sept. 20, 21—Shogomoc River.....	" "
	800	" "	" "	Sept. 20—Tafta Lake.....	" "

(c)

TABLE No. 4—FISH MARKED BY FIN CLIPPING, 1940—Concluded

	Number marked fish distributed	Species	Age	Distributed	Nature of mark: Removal of
<i>New Brunswick—Concluded</i>					
<i>Florenceville hatchery (concluded)</i>					
	200	Speckled trout.....	Two years...	July 30—Manzer Mill stream—Nashwaak River.....	Adipose and left pectoral
	400	"	"	July 24, 26—Middle brook—Nashwaak River.....	"
	300	"	"	July 31—Northeast Nackawic River.....	"
	300	"	"	July 27—Rusagonis River.....	"
	250	"	Three years	July 8, 9—Brown Lake.....	"
	335	"	"	June 8, 28—Cross creek—Nashwaak River.....	"
	335	"	"	May 30, July 5—Davidson Lake.....	"
	175	"	"	June 29—Limekiln brook—Nashwaak River.....	"
	445	"	"	May 29, 31, July 16—Nashwaakis River.....	"
	250	"	"	May 28, July 9—Pokiok River.....	"
	200	"	"	July 12, 15—River de Clute.....	"
	200	"	"	June 24—Shogomoc River.....	"
	175	"	"	June 25—Tay creek.....	"
	175	"	"	June 22—Tinkettle brook—Nashwaak River.....	"
	350	"	Four years...	June 7, 19—Cranberry Lake.....	"
	350	"	"	June 17, July 6—Second Eel Lake.....	"
	100	"	"	May 27—Hagerman brook—St. John River.....	"
	250	"	"	July 12, 15—McLeary brook—Lakeville pond.....	"
	75	"	"	July 9—Pokiok River.....	"
	300	"	Five years...	May 25, June 3—Bulls creek—St. John River.....	"
	200	"	"	May 25, 27—Big Guisguet River.....	"
	200	"	"	May 25, 27—Little Guisguet River.....	"
	100	"	"	May 28—Hardwood brook—St. John River.....	"
St. John hatchery.....	63	Rainbow trout.....	Four years...	Aug. 15—Crooked creek.....	Adipose and right ventral
	2,653	Sebago salmon.....	Yearlings...	Aug. 29—Chamcook Lake.....	Adipose and left ventral
	175	Speckled trout.....	Three years	May 14—Douglas Lake.....	"
	89	"	"	May 14—Loch Lomond.....	"
	152	"	Four years...	May 14—Loch Lomond.....	"
	4	"	Six years...	May 14—Loch Lomond.....	"
		Speckled trout.....	Fingerlings...	Oct. 25—Cardigan River, below Fishery dam.....	Adipose and left pectoral
		"	"	Oct. 26—Watt's stream, between Hardy's and Thom- son's ponds.....	"
<i>Prince Edward Island—</i>					
<i>Cardigan rearing ponds</i>	(d) 2,000				
	(d) 8,000				
Total.....	215,612				

(c) Marked by Grand Falls hatchery staff.

(d) Antigonish stock.

TABLE No. 5.—REPORTED RECAPTURES OF FISH WITH FINS MISSING

Where recaptured	Number	Species	Date	Distributed from	Fins missing
Giant Lake.....	30	Rainbow trout.....	Angling season, 1940.....	Antigonish hatchery.....	Adipose and right pectoral
Calder Lake.....	60	Speckled trout.....	" " " " " "	" " " " " "	" " " " " "
Coose Coffre Lake.....	54	" " " " " "	May 14, 30, June 12, 1940	" " " " " "	" " " " " "
Copper Lake (Antigonish County).....	225	" " " " " "	Angling season " " " "	" " " " " "	" " " " " "
Cutler Lake.....	200	" " " " " "	" " " " " "	" " " " " "	" " " " " "
Dewar dam-Barney River.....	132	" " " " " "	" " " " " "	" " " " " "	" " " " " "
Dobson Lake.....	107	" " " " " "	" " " " " "	" " " " " "	" " " " " "
Donahue Lake.....	150	" " " " " "	" " " " " "	" " " " " "	" " " " " "
East River.....	24	" " " " " "	" " " " " "	" " " " " "	" " " " " "
James River.....	84	" " " " " "	" " " " " "	" " " " " "	" " " " " "
McLean Lake.....	24	" " " " " "	" " " " " "	" " " " " "	" " " " " "
McKeen Lake.....	24	" " " " " "	" " " " " "	" " " " " "	" " " " " "
Mountain Meadow pond-West River.....	41	" " " " " "	" " " " " "	" " " " " "	" " " " " "
Sherbrook Lake and tributaries.....	371	" " " " " "	" " " " " "	" " " " " "	" " " " " "
Stewart dam on tributary to Little Harbour.....	134	" " " " " "	" " " " " "	" " " " " "	" " " " " "
Trout Lake.....	24	" " " " " "	" " " " " "	" " " " " "	" " " " " "
West River (Antigonish County).....	31	" " " " " "	" " " " " "	" " " " " "	" " " " " "
Barbour Lake.....	2	" " " " " "	May 4-Sept. 14	Cobequid hatchery.....	Adipose and right ventral
Folly Lake.....	1	" " " " " "	" " " " " "	" " " " " "	" " " " " "
Long and Shatter Lakes.....	38	" " " " " "	" " " " " "	" " " " " "	" " " " " "
River Philip.....	21	" " " " " "	" " " " " "	" " " " " "	" " " " " "
Simpson Lake.....	183	" " " " " "	" " " " " "	" " " " " "	" " " " " "
Sutherland Lake.....	563	" " " " " "	" " " " " "	" " " " " "	" " " " " "
Grand Lake.....	24	Sebago salmon.....	April 25-July 7	Grand Lake rearing ponds.	" " " " " "
William or First Lake.....	62	" " " " " "	April 16-July 1.	" " " " " "	" " " " " "
Lake O'Law brook and Lake.....	11	Speckled trout.....	June 16-July 26.	Margaree hatchery.....	Adipose and right pectoral
Margaree River at Shear dam.....	1	" " " " " "	June 25.....	" " " " " "	" " " " " "
Annapolis River.....	3	" " " " " "	May 16.....	Middleton hatchery.....	Adipose and left ventral
Bedell brook-Bulls creek.....	12	" " " " " "	" 24.....	Florenceville hatchery.....	Adipose and left ventral
Bulls creek-St. John River.....	9	" " " " " "	" 27.....	" " " " " "	" " " " " "
Private pond, Power Creek, Mr. Zeno Martin.....	10	" " " " " "	Angling season, 1938	Florenceville hatchery.....	" " " " " "
" " " " " "	50	" " " " " "	" " " " " "	Grand Falls	Adipose and right pectoral
" " " " " "	300	" " " " " "	" " " " " "	Florenceville	Adipose and left pectoral
" " " " " "	225	" " " " " "	" " " " " "	Grand Falls	Adipose and left pectoral
Kouchibouguac River.....	1	" " " " " "	May 27.....	Miramichi hatchery.....	Adipose and right ventral
Braddon brook-Loch Lomond.....	1	" " " " " "	Angling season, 1940	St. John hatchery.....	Adipose and left ventral
Chamcook Lakes.....	23	Sebago salmon.....	Oct. 23-Nov. 21	" " " " " "	Adipose and right pectoral
" " " " " "	11	" " " " " "	" " " " " "	Atlantic Biological Station, St. Andrews, N.B.	Right ventral
" " " " " "	7	" " " " " "	May 1-June 2.....	" " " " " "	" " " " " "
" " " " " "	1	" " " " " "	May 11.....	" " " " " "	" " " " " "
" " " " " "	27	" " " " " "	May 5-June 29.,	St. John hatchery.....	Right pectoral
Watt's stream-Winter River.....	22(b)	Speckled trout.....	July 25.....	Cardigan rearing ponds.	Adipose and left pectoral
" " " " " "	8(b)	" " " " " "	Oct. 28.....	" " " " " "	" " " " " "
" " " " " "	3(b)	" " " " " "	November.....	" " " " " "	" " " " " "

(b) Antigonish stock.

The 30 rainbow trout caught in Giant Lake were returns from 81 rainbow five-year olds distributed from the Antigonish hatchery spring 1940.

The recaptures of marked speckled trout reported from the Antigonish area up to the close of the angling season in 1940 represents 20.8 per cent of the number marked and distributed from the hatchery from 1935 to the end of 1939. The respective percentage recaptures of the marked fish distributed in the several lakes and streams in this district vary considerably, as shown in the following summary:

Water	Number marked fish distributed	Number recaptured	Percentage recaptured
Calder Lake.....	1,008	60	5.9
Campbell Lake-River John.....	900	24	2.7
Coosee Coffre Lake.....	1,800	519	28.8
Copper Lake (Antigonish County).....	1,800	590	32.8
Cutler Lake.....	3,313	900	27.2
Dewar dam-Barney River.....	550	194	35.3
Dobson Lake.....	1,468	272	18.5
Donahue Lake.....	3,000	852	28.4
Grant Lake.....	200	36	18.0
James River Lake or McLean Lake.....	1,800	644	35.8
Long Lake-East River St. Mary.....	3,504	77	2.2
McDonald dam-East River.....	200	54	27.0
McKeen Lake.....	200	24	12.0
Mountain Meadow pond-West River (Pictou County).....	150	41	27.3
Sherbrook Lake.....	3,163	860	27.2
Simon Lake.....	690	213	30.8
South River Lake.....	1,816	69	3.8
Stewart dam on tributary to Little Harbour.....	3,425	1,243	36.3
Trout Lake.....	200	64	32.0
West River (Antigonish County).....	3,875	53	1.4

The marked trout taken from Sherbrook Lake and tributaries were caught at widely scattered points although distributions were made in the lake proper.

Many marked sebago salmon under the size limit were taken in Grand Lake, N.S., and returned to the water, and during the collecting work approximately sixty were taken and liberated.

The thirty-four marked sebago salmon that were taken during egg collecting operations along with those reported by anglers represent 32.2 per cent of the total catch in the Chamcook Lakes for the angling season of 1940.

NOVA SCOTIA
ANTIGONISH HATCHERY

	Atlantic salmon fingerlings No. 1	Rainbow trout		Ad- vanced fry	Speckled trout				Two years	Three years	Four years
		Finger- lings No. 1	Five years		Fingerlings			Year- lings			
					No. 1	No. 2	No. 3				
Antigonish Co.—											
Beaver Meadow River					147,457						
Black River					60,000	4,000					
Brierly brook					20,000						
Copper Lake				20,000	15,000			2,000			
Gaspereaux Lake								555		900	
Glenroy River				50,000	40,000						
James River	50,000										
McLean or James River Lake					15,000			1,600			
McMillan Lake								1,200			
Maryvale or Malignant brook					20,000						
Meadow Green River				50,000	40,000						
North Lake				35,000				500			
Pinevale Lake								1,300			
Polson brook-South River				20,000	15,000						
Pomquet River						4,000					
Rights River	70,000										
South Lake				35,000							
South River	50,400			45,000		15,000		380	174	44	121
Springfield brook-Glenroy River											
West River					145,000				1,101	399	
Guysborough Co.—											
Canter Lake					10,000						
Cole Harbour Lakes					65,000						
Cocee Coffre Lake					30,000			3,500			
Country Harbour River								1,300			
Cudahys Lake	50,000				10,000						
Cutler Lake											
Dobson Lake					70,000			2,000			
Donahue Lake					80,000			3,500			
Doyle Lake					20,000			2,500			
Ecumsecum River				65,000							
Eight Island Lake				15,000							
Fitzgerald Lake								2,500			
Giant Lake			81								

BEDFORD HATCHERY

	Atlantic salmon		Speckled trout	
	Advanced fry	Fingerlings No. 1	Advanced fry	Fingerlings No. 1
<i>Colchester Co.</i> —				
Hamilton Lake.....				35,000
<i>Halifax Co.</i> —				
Conrod Lake.....				20,000
Drain Lake.....				22,000
Fish brook-West River Sheet Harbour.....				27,500
Halfway brook.....			20,000	
Little Sackville River.....		10,699		
Moser River.....	1,000	1,000		
Moore's Lake.....				27,500
Otter Lake (Musquodoboit Harbour).....				25,000
Oyster pond.....				20,000
Quilliam Lake.....				18,000
Sheldrake Lake.....				18,000
Velie Lake.....				3,080
<i>Hants Co.</i> —				
Coxcomb Lake.....				20,000
Pigot Lake.....				18,000
<i>Lunenburg Co.</i> —				
Corkum Lake.....				20,000
Spectacle Lake (Chester).....				20,000
	1,000	11,699	20,000	294,080

Total distribution..... 326,779

COBEQUID HATCHERY

	Atlantic salmon					Speckled trout			
	Fry	Advanced fry	Fingerlings			Advanced fry	Fingerlings No. 1	Yearlings	Old fish
			No. 1	No. 2	No. 3				
<i>Colchester County—</i>									
Bass River, at Five Islands.....			50,000				5,000		
Debert River.....							5,000		
East River, at Five Islands.....			50,000						
Economy River.....			50,000						
Folly River.....							10,000	3,500	
Folly Lake.....							10,000		
French River.....									
Great Village River.....	35,000		15,000					600	
Irving Lake.....			60,000						
North River, near Truro.....			50,000						
Portapique River.....								600	
Rocky Lake.....									
Salmon River.....		40,000		25,000			10,000		
Silica Lake or Bass River Lake.....							10,368	3,241	
Simpson Lake.....								600	
Truro Reservoir, Leper brook.....							10,000		
Waughts River.....									
<i>Cumberland County—</i>									
Apple River.....			50,000						
Fox River (Greville Bay).....							6,000		
Gilbert Lake.....								1,000	
Gleason brook—Portapique River.....							5,000		
Isaac Lake.....							10,000		
Leak Lake.....								500	
Little Lake-Newfound Lake.....							5,000		
McAloney Lake.....								1,000	
McLeod Lake.....							5,000	300	
Maccan River.....	40,000		20,000						
Maccan River, south branch.....						10,000			
Maccan River, west branch.....						10,000			
Mountain brook.....							10,000		
Newfound Lake.....							10,000		
Polly brook.....							5,000		
Pugwash River.....						10,000			
Ramshead River.....							6,000		
River Philip.....		45,000	180,000	50,550	76,012		10,000		
River Philip, east branch.....							15,229	57	68
River Philip, west branch.....							15,000		
Shinimikas River.....	35,000								
Sugarloaf brook.....							8,000		
Sutherland Lake.....								3,500	
Tidnish River.....	25,000								
Tillies creek.....						8,000			
Wallace River.....	40,000	35,000	25,000				10,000		
Wallace River, west branch.....							10,000		
Webb Lake.....							5,000		
<i>Westmorland County—</i>									
Long Lake—Tantramar River.....								1,500	
Long Lake stream—Tantramar River.....							4,000		
North brook—Tantramar River.....							8,000		
Robinson brook—Tantramar River.....			35,000						
Silver Lake or Morice Pond.....								1,695	
	175,000	120,000	585,000	75,550	76,012	38,000	207,597	18,093	68

Total distribution..... 1,295,320

DEPARTMENT OF FISHERIES

COLDBROOK PONDS

	Rainbow trout fingerlings		Speckled trout fingerlings	
	No. 2	No. 3	No. 2	No. 3
<i>Kings County—</i>				
Annapolis river.....			20,000	
Armstrong Lake.....			10,000	
Aylesford Lake.....				60,000
Burke Lake.....			20,000	
Canard River.....			10,000	
Cornwallis River.....			20,000	
Crooked Lake.....			10,000	
Caspereau Lake.....				30,000
Habitant River.....			5,000	
Hardwood Lake.....				15,000
Lake Paul.....				30,000
Lake Torment.....			15,000	20,000
McGee Lake.....			5,000	
Mack Lake.....				5,000
Mud Lake.....				10,000
Murphy Lake.....				20,000
Nimchin Page Lake.....				5,000
Sunken Lake.....	12,000	27,340		
Trout River.....			10,000	
Turbett Lake.....				10,000
Upper Sixty Lake.....			10,000	
	12,000	27,340	135,000	205,000

Total distribution..... 379,340

GRAND LAKE PONDS

	Atlantic salmon					Speckled trout Yearlings	Sebago salmon		Ouananiche four years
	Fingerlings				Year-lings		Two years	Three years	
	No. 1	No. 2	No. 3	No. 4					
<i>Colchester County—</i>									
Pembroke River.....					2,000				
Stewiacke River.....		12,500							
Stewiacke River, south branch...		12,500							
<i>Halifax County—</i>									
Abrahams Lake.....						900			
Black Point Lake.....						700			
Chezzetcook River.....			25,000		5,000				
Eagle Lake (Mineville).....						650			
First pond (Ketch Harbour).....						700			
Five Island Lake.....						1,900			
Governor Lake.....						700			
Grand Lake.....							9,609	1,529	1
Hatchet Lake.....						1,000			
Higgins Lake.....						825			
Ingram River.....			12,500		5,000				
Long Lake—Lake Major.....						650			
Long or Bennery Lake.....						500			
Loon Lake—Scraggy Lake.....						1,200			
Moody Lake.....						700			
Moose River—Ship Harbour River.....		12,500	12,500						
Moser River.....	2,000	500	2,000	2,000					
Musquodoboit River.....		25,000	25,000		5,000				
Ninemile River.....			25,000		5,000				
Pace Lake.....						1,000			
Partridge run—Echo Lake.....			12,500						
Upper Petpeswick, Long Bridge or Bridge End Lake.....						1,500			
Quoddy River.....			12,500	10,000					
Ragged Lake—Prospect River.....						700			
Rawdon River.....			12,500		5,000				
Sackville River.....			25,000	10,000	9,000				
Big Salmon River—Echo Lake.....			25,000		5,000				
Little Salmon River (Cole Harbour).....			12,500		5,000				
Salmon River (Port Dufferin).....		50,000							
Sawlor Lake.....						1,000			
Ship Harbour River.....					5,000				
Smith brook (Necumteuch).....	3,000								
Tangier River.....			25,000		8,260				
West River Sheet Harbour.....		12,500	12,500						
William or First Lake.....						700			
<i>Hants County—</i>									
Cameron Lake.....						700			
Kennetcook River.....		25,000			10,000				
Pentz Lake.....						700			
Valley or McLellan Lake.....						600			
<i>Lunenburg County—</i>									
East River.....			25,000						
Gold River.....		12,500	12,500		5,000				
Hennigar Lake.....						1,000			
Middle River.....		25,000			5,000				
Spondo Lake.....						900			
	5,000	188,000	277,000	22,000	79,260	19,225	9,609	1,529	1

Total distribution..... 601,624

KEJIMKUJIK PONDS

	Atlantic salmon fingerlings No. 3	Speckled trout fingerlings		
		No. 1	No. 2	No. 4
<i>Annapolis County—</i>				
Fairy Lake.....		2,500		
Little River.....		5,000	5,000	
Maitland River.....			10,000	
Mount Tom brook.....		2,740		
Pretty Mary Lake.....				2,500
West River.....			10,000	
<i>Queens County—</i>				
Christopher brook.....				1,500
Fifteen Mile brook.....				2,500
Grafton Lake.....				514
High Lake.....		2,500		
Kejimkujik Lake.....		30,446	5,500	
Medway River.....	267,000			
Newts Lake.....				2,022
	267,000	43,186	30,500	9,036

Total distribution..... 349,722

LINDLOFF HATCHERY

	Atlantic salmon fingerlings		Speckled trout				
	No. 2	No. 3	Fingerlings			Yearlings	Two years
			No. 1	No. 2	No. 4		
<i>Cape Breton Co.—</i>							
Canoe Lake.....			15,000				
Chain or String Lakes-Mira River.....			15,000				
Cochran Lake.....				15,000			
Gaspercaux River.....	25,000	20,000					
Gillies Lake (East bay).....				15,000			
Hardy Lake.....				15,000			
Kelvin Lake.....				15,000			
Loon Lake (Mira bay).....				15,000			
McCormick Lake.....				20,000			
Meadow brook-Sydney river.....			15,000	10,000			
Otter Lake.....				5,000			
Salmon River.....	95,000	140,000					
<i>Inverness Co.—</i>							
McIntyre Lake.....						2,089	167
<i>Richmond Co.—</i>							
Black River.....			40,000				
Breen Lake.....			20,000				
Buchanan Lake.....			20,000				
Chain Lakes (Madame Island).....			20,000				
Ferguson Lake.....			30,000				
Ferguson brook.....			10,000				
Grand Lake (Madame Island).....			30,000	15,000	9,000		
Grand River.....	75,000	20,000					
Loch Lomond.....	165,000	143,863					
MacLeod brook.....			10,000				
McIsaac Lake.....			15,000	15,000			
McKenzie Lake.....			35,000				
Mary Ann's Lake.....			20,000		1,000		
Mill Lake-East River Tillard.....				24,276	5,000		
Potties Lake (Madame Island).....				15,000	5,000		
St. Esprit Lake.....			25,000				
Seaview Lake.....			20,000				
Scott brook.....			25,000				
Shaw Lake (Madame Island).....			15,000		5,137		
Stratton brook.....			10,000				
River Tillard, east.....			30,000				
River Tillard, west.....			60,000				
Thompson Lake.....			20,000		1,000		
River Tom.....			20,000				
	360,000	323,863	523,000	179,276	26,137	2,089	167

Total distribution..... 1,414,532

MARGAREE HATCHERY

	Atlantic salmon					Speckled trout										
	Fry	Ad- vanced fry	Fingerlings				Fingerlings					Year- lings	Two years	Three years	Old fish	
			No. 1	No. 2	No. 3	No. 4	No. 1	No. 2	No. 3	No. 4	No. 5					
<i>Cape Breton Co.</i> —																
Belle Lake.....																
Black brook-Mira River.....																
Browns Lake-Indian Bay.....																
Catalagne Lake.....																
Ferguson Lake (New Boston).....																
Forester Lake.....																
Giovanetti Lake.....																
Grand Lake-Indian Bay.....																
Grand Lake, near Louisburg.....																
Jackson or Johnson Lake.....																
Keele Lake.....																
Lily pond.....																
McDonald pond.....																
McDonald or Widow Lake (New Boston).....																
McInnes Lake.....																
McIntyre Lake (New Boston).....																
McMillan Lake.....																
McPherson Lake (New Boston).....																
Stewart Lake.....																
Trout brook-Mira River.....																
Daleen Lake (Boularderie Island).....																
<i>Inverness Co.</i> —																
Big brook—River Denys.....																
Captain John's brook.....																
Chevincamp River.....																
Farm brook.....																
Flat brook.....																
Galant River.....																
Gillis brook.....																
Glen brook-River Denys.....																
Graham River.....																
Grand Etang brook.....																
Horton Lake.....																
Little Judique River.....																
Northeast Mabou River.....																
Southwest Mabou River.....																
Northeast Margaree River—																
Big brook.....																
Big Intervale bridge.....																
Black Rock pool.....																
Cranton bridge.....																
Doyle's bridge.....																
Egypt brook.....																
Ethridge pool.....																

[illegible]

Total distribution.

3,999,486

DEPARTMENT OF FISHERIES

MERSEY RIVER PONDS

Atlantic salmon
fingerlings
No. 3

Queens Co.—

Mersey River (below No. 3 development)	111,600
Total distribution	111,600

MIDDLETON HATCHERY

	Atlantic salmon fingerlings		Salmon trout fingerlings No. 2	Speckled trout fingerlings			
	No. 2	No. 3		No. 1	No. 2	No. 3	No. 4
<i>Annapolis Co.—</i>							
Annapolis River.....		20,000					
Barnes Lake.....					10,000		
Boot Lake.....					20,000		
Crisp brook.....				10,000			
Durland Lake.....						6,000	
Durling Lake.....				10,000			
Elliott Lake.....				12,000			
Fed Lake.....				8,000			
Fishers Lake.....						10,000	
Gibson Lake.....				10,000			
Grand Lake.....				6,000			
Lake Jolly.....					20,000		
Katy or Cady Lake.....					10,000		
Lamb brook.....				6,000			
Lake LaRose.....				12,000			
Lequille River.....	25,000						
Lily Lake.....					10,100		
Little River-Annapolis River.....				10,000			
McGill Lake.....				15,000			
McKewon Lake.....						8,000	
Medicraft Lake.....				15,000			
Millbury Lake.....					10,000		
Mink brook.....				8,000			
Morton brook.....				5,000			
Mulgrave Lake.....						3,100	
Nictaux River.....		87,000			10,800	3,800	
Paradise Lake.....				20,000			
Lake Pleasant.....				20,000			
Power Lot brook-Annapolis River.....					6,000		
Round Hill River.....		25,000					
Rumsey Lake.....						8,000	
Sand Lake.....						2,000	
Sandy Bottom Lake.....						10,000	
Scrag Lake.....						5,000	
Shannon Lake.....				15,000			
Simpson Lake.....						10,000	
Sixty Lake.....						10,000	
Slocomb brook.....				8,000		2,200	
Thirty Lake.....				20,000			
Trout Lake.....						8,000	
Walker brook.....					10,000		
Waterloo Lake.....					10,000		
Wiswell brook.....					5,000		
Wright Lake.....				10,000			
Zwicker Lake.....				15,000			
<i>Digby Co.—</i>							
Haines Lake.....					10,000		
Harris Lake.....						8,000	
Mallett Lake.....					10,000		
Porter or Mistake Lake.....					14,000		
Round Lake.....					10,000		
<i>Hants Co.—</i>							
Avon River, west branch.....	25,000	13,000					
Falls Lake stillwater.....						10,000	
Halfway River.....					8,000		
Lebreau brook.....					10,000		
Maple brook.....					8,000		
Mockingbird Lake.....				20,000			
Murphy Lake.....				10,000			
Panuke Lake.....					15,000	15,000	
Lake Pleasant.....							4,980
Zwicker Lake.....				10,000			
<i>Kings Co.—</i>							
Caspereau River.....		6,000					
<i>Lunenburg Co.—</i>							
Butler Lake.....				10,000			
Canoe Lake, north.....					10,000		
Card Lake.....				20,000			
Feener Lake.....						5,000	
Franev Lake.....				10,000			
Gold River.....	64,000	20,000					
Harris Lake.....					10,000		

MIDDLETON HATCHERY—*Concluded*

	Atlantic salmon fingerlings		Salmon trout fingerlings No. 2	Speckled trout fingerlings			
	No. 2	No. 3		No. 1	No. 2	No. 3	No. 4
<i>Lunenburg Co.—Concluded</i>							
Holbert Lake				12,000			
Indian Lake-Gold River					10,000		
Lahave River	32,000	45,000					
Lewis Lake					10,000		
Maligeak Lake						12,000	
Middle River		50,000					
New Germany Lake				15,000			
Ninevah Lake					15,000		
Peruette Lake					12,000		
Petite River		25,000					
Sherbrooke Lake			63,000				
Smith Lake				10,000			
Spectacle Lake-Maligeak Lake						6,000	
Veinot brook				7,000			
Wentzell Lake						5,000	
West or Rocky Lake-Ohio River					12,000		
Whalen Lake					10,000		
Whetstone Lake					15,000		
Wiles stillwater-Lahave River				10,000			
Wild Cat River					7,000		
Lake William				20,000			
<i>Queens Co.—</i>							
Christopher Lake					8,000		
Harmony brook				5,000			
Medway River					10,000		
Redwater Lake						7,000	
Westfield River				5,000			
	146,000	291,000	63,000	399,000	335,900	154,100	4,980

Total distribution..... 1,393,980

NICTAUX FALLS REARING STATION

	Atlantic salmon fingerlings No. 1
<i>Annapolis Co.—</i>	
Annapolis River	30,000
Shannon River	35,000
Nictaux River	68,000
	133,000
Total distribution	133,000

Harris Lake.....	100,000	30,000	60,000	24,000	30,000	125	15,000	10,000	430,000	120,000	194,000	145,000	17,600	11,000	290	130	22
Kegeshook Lake.....																	
Mood brook—Salmon River.....																	
Randal brook.....																	
Reynard bridge—Carleton River.....																	
Ryerson brook.....									10,000								
Solomon Lake.....									50,000	50,000	30,000	15,000					
Tusket River.....									25,000								
Tusket River, east branch.....																	
Lake Utley.....																	
	100,000	30,000	60,000	24,000	30,000	125	15,000	10,000	430,000	120,000	194,000	145,000	17,600	11,000	290	130	22

Total distribution..... 1,187,167

NEW BRUNSWICK

CHARLO HATCHERY

	Atlantic salmon fingerlings		Speckled trout	
	No. 1	No. 2	Fry	Fingerlings No. 3
Antinori Lake.....				29,000
Charlo River, north branch.....				10,000
Christopher brook.....				7,000
Black brook.....				4,000
Eel River.....				7,000
Jacquet River.....		90,000		
Lamontagne Lake.....			20,000	
Louison creek.....				7,000
Middle River.....	45,000			
Nipisiguit River.....	162,612	30,000		
Restigouche River.....	90,000	600,000		
Kedgwick River.....		110,000		
Little Main River.....	30,000			
Matapedia River.....	30,000	235,374		
Upsalquitch River.....	60,000	137,377		
Walker brook.....				2,000
	417,612	1,202,751	20,000	66,000

Total distribution..... 1,706,363

FLORENCEVILLE HATCHERY

	Atlantic salmon fingerlings		Speckled trout					
	No. 1	No. 2	Finger- lings No. 1	Year- lings	Two years	Three years	Four years	Five years
Atlantic Biological Station, St. Andrews, N.B.				100				
<i>Carleton County—</i>								
Becaguimec River	100,000	52,000						
Bogan brook—Southwest Miramichi River		10,000						
Bubby brook—St. John River			3,000					
Bulls creek—St. John River			50,000	2,000				300
Bull creek—Eel River			20,000	1,600				
Burpee brook—Presquile River			10,000					
Burntland brook—Becaguimec River			6,000					
Buttermilk brook—St. John River			1,000					
Clearwater brook—Southwest Miramichi River		10,000						
Colton brook—Shiktahawk River			5,000					
Debee brook—St. John River			10,000					
Dingee brook—St. John River			1,500					
Elliot brook—Southwest Miramichi River		15,000						
Gallivan brook—St. John River			7,000					
Gibson Mill brook, north branch—St. John River				1,200				
Big Guisguitt River			25,000	1,900				200
Little Guisguitt River			25,000	2,753				200
Hagerman brook—St. John River			15,000	600			100	
Hardwood brook—St. John River			4,000					100
Lanes creek—St. John River				600				
McLeary brook—Lakeville pond			15,000	600			250	
McLeod brook—St. John River			10,000					
Mallory brook—St. John River			6,000					
Maynes brook—Little Presquile River			15,000	900				
Medunnekeag River	100,000	30,000						
Mile brook—St. John River			1,000					
Southwest Miramichi River, north branch	50,000	35,000						
Southwest Miramichi River, south branch	100,000	60,000						
Monquart River		35,000						
Big Presquile River	50,000	50,809						
Little Presquile River	40,000							
Priest brook—Monquart River			5,000					
River de Chute			30,000	1,600		200		
Big Shiktahawk River		20,000						
Little Shiktahawk River		20,000						
Smith brook—Becaguimec River			5,000					
Smith pond—Southwest Miramichi River			10,000					
Teague brook—Southwest Miramichi River		10,000						
Tweedie brook—St. John River			3,000					
<i>Madawaska County—</i>				496				
Private pond, Power creek, Mr. Zeno Martin								
<i>York County—</i>								
Brown Lake				1,200		250		
Conn brook—Shogomoc River			5,000					
Cranberry Lake				1,300			350	
Cross creek—Nashwaak River			40,000	1,200		335		
Davidson Lake			60,000	1,500		335		
Dunbar brook—Nashwaak River			10,000					
Second Fel Lake			40,000	2,400			350	
Indian Lake			30,000					
Kelly creek—St. John River			10,000					
Keswick River	40,000	35,000						
Kingsley brook—Nashwaakis River			10,000					
Limekiln brook—Nashwaak River			15,000	600		175		
Longs creek—St. John River			10,000					
McBean brook—Nashwaak River			10,000					
McCallums brook—Nashwaak River			10,000					
McIntosh brook—St. John River			10,000					
Mactaquac River		35,000						
Manzer Mill stream—Nashwaak River			10,000		200			
Middle brook—Nashwaak River			15,000		400			
Mill brook—Mactaquac River				1,200				
Nackawic River	50,000							
Northeast Nackawic River					300			
Nashwaak River	120,000	60,000						
Nashwaakis River			85,000	1,200		445		
Pidgeon brook—Nashwaak River			10,000					
Pokiok River			60,000	2,400		250	75	
Risten Lake			20,000					
Rusagonis River			30,000		300			
Shogomoc River			60,000	3,000		200		
Skiff Lake	50,000	60,000						
Taffa Lake			30,000	800				
Tay River			20,000				175	
Tinkettle brook—Nashwaak River			3,000				175	
	700,000	537,809	885,500	31,149	1,200	2,540	1,125	800

Total distribution 2,160,123

DEPARTMENT OF FISHERIES

GRAND FALLS HATCHERY

	Atlantic salmon				Speckled trout				
	Advanced fry	Fingerlings			Fry	Advanced fry	Fingerlings		
		No. 1	No. 2	No. 3			No. 1	No. 2	No. 3
<i>Charlotte County—</i>									
St. Patrick Lake								10,535	
<i>Salmon River—Victoria County—</i>									
Salmon River flats		35,000							
Salmon River headwaters			68,000	13,300					
Salmon River, at Estey camp		20,000							
Salmon River, at Guimont lodge		40,000							
Salmon River, at Mignault lodge		40,000							
Aubin crossing		35,000							
Big bog		40,000							
Boat Landing	10,000	35,000							
Cote Mill	25,000	35,000							
Covered bridge	25,000	35,000							
Cyr flats		35,000							
Davis Mill		35,000							
Iron Bridge		35,000							
Little Salmon River		35,000	40,000						
Mooney brook					12,000				
Sutherland brook						15,000	35,000		20,000
<i>St. John River—Victoria County—</i>									
Andover			40,000						
Andover bar		40,000							
Argosy	25,000								
Aroostook bar		40,000							
Boutout brook						8,388			
Cliffordvale	25,000								
Coronation	25,000								
Costigan point	25,000								
Dee point		40,000							
Falls brook							3,866		
Four Falls brook						10,000			5,000
Hatchery brook, above falls							8,000	9,009	
Hatchery brook, below falls		6,734							
Hitchcock flats		40,000							
Inman flats	25,000	45,000	40,000						
Kilburn ferry	25,000	45,000							
Limestone		35,000							
McLaughlin flats	25,000								
Morrill	25,000		35,000						
Muniac River, mouth of		60,000							
Ortonville	25,000	35,000							
Perth			40,000						
Perth, lower		35,000							
Pokiok stream									30,000
Pokiok stream, headwaters									30,000
Tobique River, mouth of	25,000	40,000	30,000						
Arthurette bridge		80,000							
Millers		80,000							
Millers bog		40,000							
Sadlers		15,000							
Three brooks, below dam									5,000
<i>Madawaska County—</i>									
Baker brook									20,000
Baker Lake									20,000
Caron Lake								120,000	40,000
Grand River								80,000	
Green River									20,000
Iroquois River									20,000
Ledges pond									10,000
Little River						20,000			29,345
Headwaters									5,000
Big Brook									10,000
Deadwater or Dead brook						10,000			
Poitras brook					11,000				
Ryan brook						10,000			
Six Mile brook					12,000				
Quisibis River								10,000	
Arsenault brook								5,000	
Baisley brook								5,000	
Deep brook								5,000	
Little brook								5,000	
McCoil brook								5,000	
Morneault brook								5,000	
Siegas River								15,000	
Black brook								5,000	
Clark's forks								5,000	
Murtial brook								5,000	
Suey brook								5,000	
Siegas Lake, outlet								5,000	
Thibodeau brook—Green River									20,000
Trout River									20,000
Unique Lake									20,000
<i>Pokenagamooke Lake, Temiscouata County, Quebec</i>									
									5,000
	310,000	876,734	518,000	43,300	35,000	73,388	46,866	299,544	329,345
Total distribution						2,532,177			

MIRAMICHI HATCHERY

	Atlantic salmon		Speckled trout	
	Advanced Fry	Fingerlings No. 1	Fingerlings No. 1	Yearlings
Little Southwest Miramichi River.....	180,000	449,780	.....	.....
Middle River.....	39,000	.....	.....	.....
Northwest Miramichi River.....	810,000	82,800	.....	.....
Millstream.....	105,600	.....	.....	.....
Sevogle River.....	.....	320,000	.....	.....
Salmon River.....	.....	.....	.....	51
Southwest Miramichi River.....	.....	186,600	.....	.....
Barnaby River.....	163,200	.....	.....	.....
Cain River.....	163,200	40,000	.....	.....
Renous River.....	220,800	40,000	.....	.....
Dungarvon River.....	115,200	.....	.....	.....
Taxis River.....	48,000	81,200	.....	.....
Tabusintac River.....	57,600	.....	.....	.....
Eskedelloe River.....	.....	.....	3,900	.....
Tetagouche River.....	.....	67,200	.....	.....
Tweedie's Meadow brook.....	.....	.....	53,100	.....
	1,902,600	1,267,580	57,000	51

Total distribution..... 3,227,231

[illegible]

PRINCE EDWARD ISLAND

CARDIGAN PONDS

	Rainbow trout fingerlings No. 3	Speckled trout fingerlings		
		No. 2	No. 3	No. 4
<i>Kings County—</i>				
Bear River.....			6,000	
Big brook—Fortune River.....			15,000	
Big pond (Hermanville).....				10,000
Brudenell River.....			10,000	
Buell's brook—(Murray Harbour).....		4,000		
Burge's pond—St. Peter bay.....				1,000
Cardigan River.....				6,000
Compton's stream—Sturgeon River.....			6,000	
Crane's pond—Morell River.....			6,000	
Creed's pond—Sturgeon River.....			6,000	
East or Hillsborough River.....			6,000	
Finlayson's pond—Greek River.....				8,000
Fox River.....		3,000		
Goose River.....			6,000	
Hay River.....			6,000	
Hooper's pond—St. Peter's Lake.....			6,000	
Jenkin's pond—Greek River.....				2,000
Leard's pond—Morell River.....				8,000
MacLeod's pond—Murray River.....		8,000		
McAulay's brook—Morell River.....				3,000
McCaskil River.....			3,000	
McDonald's pond—North Lake.....			5,000	
McKinnon stream—Morell River.....				6,000
McLeod's pond—Midgell River.....			6,000	
McPherson's pond—Montague River.....			6,000	
McRae's pond—Montague River.....		4,000	4,000	
Montague River.....				10,000
Montague pond.....			6,000	
Mooney's pond—Morell River.....				5,000
Munn's brook—Brudenell River.....				3,000
Naufrage River.....			9,000	
Poole's pond—Montague River.....			3,000	
Priest pond (Bayfield).....			6,000	
Sturgeon River.....			4,000	
Webster's pond—Marie River.....			6,000	
<i>Prince County—</i>				
Barbara Weit River.....			5,000	
Bell's stream (Cape Traverse).....			3,000	
Brae River.....			4,000	
Cain's stream—Mill River.....			8,000	
Cannon's pond—Smelt River.....			3,000	
Carr's brook (Malpeque bay).....			3,000	
Clark's pond—Wilmot River.....			8,000	
Currie's pond—Little Pierre Jacques River.....			6,000	
Dunk River.....			15,000	
Enmore River.....			6,000	
Fitzgerald's pond—Grand River.....			3,000	
Green's stream—Miminegash pond.....			6,000	
Harper's pond—Tignish River.....			8,000	
Haywood's pond—Little Tignish River.....			5,000	
Hunter's pond (Baltic).....				4,000
McArthur's pond—Foxley River.....			3,000	
McWilliam's pond—Pierre Jacques River.....			6,000	
Old Wool Mill pond—Tryon River.....			4,000	
St. Nicholas pond (Sunbury Cove).....				6,000
Scales pond—Dunk River.....			10,000	
Sheep River.....			6,000	
Tuplin's pond—Indian River.....			6,000	
Waddell's pond (Traverse Cove).....			3,000	
Webster's pond (Augustine Cove).....			3,000	
Wright Leard's pond—Dunk River.....			8,000	
<i>Queens County—</i>				
Andrew's pond—Hunter River.....			3,000	
Ballen's stream— (Pownall bay).....			3,000	
Belle River.....				8,000
Black River—Covehead bay.....				5,500
Clark's stream—East River.....		6,000		

CARDIGAN PONDS—*Concluded*

	Rainbow trout fingerlings No. 3	Speckled trout fingerlings		
		No. 2	No. 3	No. 4
<i>Queens County—Concluded</i>				
Coles' pond—North River.....			6,000	
Cook's pond—Newton River.....			3,000	
Crooked creek—Wheatley River.....			4,000	
Dixon's pond—DeSable River.....		6,000		
Found's pond—Stanley River.....			3,000	
Gates' pond—North River.....			3,000	
Glenfinnan Lake.....	41,040			
Hardy's pond—Winter River.....		4,000	4,000	
Holmes' pond—DeSable River.....		3,000		
Hope River.....				9,000
Lane's brook—Vernon River.....				3,000
Leard's pond—Crapaud River.....			6,000	
Leard's pond—Pisquid River.....			8,000	
McAulay's brook (Tracadie bay).....		5,000		
McLeod's pond—Belle River.....		1,500		
McMillan's pond—Vernon River.....				4,000
McPherson's pond—Flat River.....		5,000		
McPherson's pond—Pinette River.....			6,000	
Parson's pond—Glynde River.....			8,000	
Pisquid or O'Keefe's Lake.....	41,000			
Rackham's pond—Wheatley River.....			8,000	
Ross' pond—Vernon River.....				6,000
Simpson's pond—Hope River.....			5,000	
Southwest River.....			4,000	
Stevenson's pond (Rustico Harbour).....			5,000	
Stordy's pond—Crapaud River.....			6,000	
Watt's stream—Winter River.....				8,000
West River.....			9,000	
Winter River.....		5,000	5,000	
Winter River, north branch.....		4,000		
Wisner's pond—Clark's stream.....		1,000		
	82,040	59,500	362,000	115,500

Total distribution..... 619,040

KELLY'S POND HATCHERY

	Atlantic salmon fingerlings No. 1	Speckled trout		
		Fry	Fingerlings	
			No. 1	No. 2
<i>Kings County—</i>				
Dingwell stream—Fortune River.....				6,000
Fitzpatrick's pond—Seal River.....				4,367
Larkin's pond—Naufrage River.....				6,000
Leard's, below Mill—Morell River.....	40,000			
MacDonald's pond—Fortune River.....				5,000
McInnis' pond—Souris River.....				5,000
Mallard's pond—Souris River.....				5,000
Marie River.....	20,000			
Midgell river.....	25,000			
Mooney's bridge—Morell River.....	32,000			
Morell River.....	174,840			
Quigley's pond.....				6,000
Head of St. Peter Bay.....	25,000			
Warren's pond—Head of East or Hillsborough River.....				6,000
<i>Prince County—</i>				
Bain creek.....			4,000	
Barlow pond—Grand River.....			4,000	
Bell's stream—Mill River.....			6,000	
Conroy's pond.....			5,000	
Gard's pond—Mill River.....			6,000	
Gordon's pond—Kildare River.....			8,000	
Leard's pond—Trout River tributary to Lot 10 river.....			6,000	
McAusland's pond—Mill River.....			4,000	
McNally's pond—Jacques River.....			5,000	
Marchbank's pond—Trout River (Tyne valley) ..			5,000	
Rix's pond—Kildare River.....			6,000	
Round pond.....			5,000	
<i>Queens County—</i>				
Andrews' pond—East River.....			6,000	
Bagnall's pond—Hunter River.....				4,360
Black River—Tracadie Bay.....			5,000	
Brander's pond.....			4,000	
Cousins pond.....			4,000	
Craswell's pond—Hunter River.....				4,360
Howatt's pond.....		1,000		
McLean's Brothers pond— West River.....			6,000	
Scott's pond—Clyde River.....			6,000	
	316,840	1,000	95,000	52,087

Total distribution..... 464,927

BRITISH COLUMBIA

ANDERSON LAKE HATCHERY

Anderson Lake—	Sockeye salmon eyed eggs
Clemens creek	724,968
Ternan creek	221,526
	946,494
Total distribution	946,494

DOMINION OF CANADA

TWELFTH
ANNUAL REPORT
OF THE
DEPARTMENT OF FISHERIES

SEVENTY-FIFTH ANNUAL FISHERIES
REPORT OF THE DOMINION

FOR THE YEAR

1941-42



OTTAWA
EDMOND CLOUTIER
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1942

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*To His Excellency Major-General the Right Honourable the Earl of Athlone,
K.G., P.C., G.C.B., G.M.M.G., G.C.V.O., D.S.O., A.D.C., Governor General
and Commander-in-Chief of the Dominion of Canada.*

MAY IT PLEASE YOUR EXCELLENCY:

I have the honour to submit herewith, for the information of your Excellency and the Parliament of Canada, the Twelfth Annual Report of the Department of Fisheries, being the Seventy-fifth Annual Fisheries Report for the Dominion.

I have the honour to be,

Your Excellency's most obedient servant,

J. E. MICHAUD,
Minister of Fisheries.

DEPARTMENT OF FISHERIES,
OTTAWA, April 7, 1942.

DEPUTY MINISTER'S REPORT

To the Hon. J. E. MICHAUD, M.P.,

Minister of Fisheries.

SIR,—I have the honour to submit the Seventy-fifth Annual Report on the Fisheries of Canada, which is the Twelfth Annual Report of the Department of Fisheries and covers the fiscal year 1941-42.

For reasons of economy the report has been substantially reduced in size. In its main body the results of commercial fishing operations in the Dominion during the calendar year 1941 are dealt with, and various other matters, but in less detail than in some earlier years. Several appendices which it has been the custom to include in the past have this year been omitted and those which have been retained have been put in more condensed form. These latter appendices include:

The Reports of the Chief Supervisors of Fisheries.

A Report on the Department's Fish Culture Work.

A Report on Oyster Culture.

A Report of the Fisheries Engineer.

An abbreviated Financial Statement.

FISHERIES RESULTS IN THE CALENDAR YEAR, 1941

In value on the market Canada's fisheries production in 1941 exceeded that of any previous year in the Dominion's history and amounted in round figures to \$62,258,900 or very nearly \$2,000,000 more than the total for 1918, the former record year. As compared with results for 1940 the marketed value for 1941 showed an increase of nearly \$17,140,000, or about 38%. So far as dollar return to the fishermen is concerned—that is the value of the catch to the fishermen as landed—the year brought an increase of about \$10,750,000. All told the landed value of the catch, using round figures here as in most other cases, was \$34,379,400 as compared with \$23,630,400 in the preceding year. The large increases in marketed and landed value were traceable to greater firmness of price, as aggregate catch was about 30,853,000 pounds less than in 1940, or 1,198,856,200 pounds. The decrease in landings occurred in the sea fisheries, fresh water catch showing some gain. Of the marketed value total the sea fisheries, of course, accounted for by far the greater part. The value of the sea production was \$54,325,900 and the value of the fresh water catch \$7,933,000. Sea fisheries return increased by more than \$15,415,000, notwithstanding reduction in catch, and the increase in the case of the fresh water fisheries was \$1,724,300. So far as marketed value is concerned, there was increase in 1941 in each of the provinces, except Alberta where there was a small reduction, about \$10,130 as compared with 1940 results. On the increase side the major gain, a little more than \$10,000,000, was in British Columbia and was mainly traceable to the record pack of canned salmon, though the Pacific fisheries, in general, showed increased returns. In the case of Nova Scotia, the year's increase in marketed value was something over \$2,790,000. Both in New Brunswick and Manitoba the gain was well over the million dollar level—nearly \$1,420,000 in the former province and nearly \$1,245,000 in the latter.

Marketed value figures by provinces, with returns from the sea fisheries and the fresh water fisheries shown separately, are given in the following table:

	Sea	Inland	Totals
	\$	\$	\$
Nova Scotia.....	12,634,832		12,634,832
New Brunswick.....	6,458,261	26,570	6,484,831
Prince Edward Island.....	952,026		952,026
Quebec.....	2,548,702	293,339	2,842,041
Ontario.....		3,518,402	3,518,402
Manitoba.....		3,233,115	3,233,115
Saskatchewan.....		414,492	414,492
Alberta.....		440,444	440,444
British Columbia.....	31,732,037		31,732,037
Yukon.....		6,652	6,652
Totals.....	54,325,858	7,933,014	62,258,872

Somewhat more detailed references to sea fisheries operations and other results during 1941 will be found in the chief supervisors' appendices and complete statistical details are given in *Fisheries Statistics of Canada, 1941*, which has been prepared by the department and the Dominion Bureau of Statistics, with the collaboration of provincial departments concerned with fisheries matters. It will be sufficient here to refer only briefly to the results of operations in a few of the major fisheries. The salmon fishery continued to rank first in point of marketed value return. All told, the salmon landings amounted to 1,938,880 hundredweights, or nearly 480,700 hundredweights more than in 1940. All of the catch, except 1,500 hundredweights or so, was taken in the sea fisheries, and much the greater part of it, or nearly 1,900,350 hundredweights, was caught by Pacific Coast fishermen. On the market the salmon catch was valued at \$21,475,300, or nearly \$7,305,000 more than the 1940 total. The outstanding feature of operations in this fishery was, of course, the production of a record pack of 2,248,870 cases of canned salmon in British Columbia. The great size of the pack was due in part to the satisfactory size of the salmon runs in British Columbia waters and in part to the special effort which was made to meet the needs of the people of Great Britain for canned salmon. Under an agreement made between the Ottawa and London governments two-thirds of the pack was made available to Great Britain.

Under another agreement between the Canadian and British governments the Dominion undertook a special effort to supply an increased quantity of canned round herring for shipment to the United Kingdom. Production of canned herring had increased greatly since the beginning of the war but it rose to new high figures in 1941 when, all told, 1,037,500 cases were packed, or 247,000 more than in the preceding year. The great bulk of the output—by far the greater part of it from British Columbia—was shipped to Britain. The total marketed value of the sea herring taken in 1941, including, of course, not only the canned herring but herring marketed in other forms as well, exceeded \$6,480,000, as compared with \$6,033,000 in 1940.

In 1940 sea herring had ranked next to salmon in order of total marketed value for the year with cod in third place. Last year, however, largely as a result of improvement in the dried fish trade, cod moved above herring in the marketed value total. The quantity of cod caught, all save a small fraction of it being taken by Atlantic Coast fishermen, was approximately 1,957,100 hundredweights, or some 24,000 hundredweights more than in 1940. On the marketed value side the increase was proportionately much greater. All told, the cod landings were valued on the market at \$7,494,600, or \$2,510,000 more than in the year before. The marketed value return from the lobster fishery, entirely an Atlantic Coast fishery, rose to \$3,858,700, or \$671,000 more than in 1940. The catch showed an increase of a little more than 10,000 hundredweights.

Among the fresh water fish the whitefish again stood first in aggregate marketed value—\$2,492,700, or about \$563,800 more than in 1940.

Capital Investment and Employment.—Boats, vessels, fishing gear, shore plants and equipment used in the fisheries during the year represented a capital investment of \$55,018,000, or nearly \$5,540,000 more than 1940. In the case of investment in the fishing fleet and gear, there was an increase of more than \$1,260,000, which brought the total to slightly more than \$27,483,000. Investment in shore plants and equipment was \$27,535,000 but the increase over the 1940 figures exceeded \$4,277,000. So far as fisheries working force is concerned, the year showed a sharp reduction, 4,527. The number of workers in the canneries and processing plants, 15,842, showed an increase of very nearly 800, but fishermen decreased by more than 5,300. The reduction is explained, of course, by enlistments and by the movement of fishermen to munitions plants and war equipment factories.

SEA FISHERIES RESULTS

Total catch of sea fish and shellfish was smaller in 1941 than in 1940 and the increase of \$15,415,000 already noted in the marketed value of the production was due to the greater firmness of prices. The catch totalled about 11,095,000 hundredweights or approximately 310,000 hundredweights less than in 1940. There was decrease in each of the sea fisheries provinces except New Brunswick and there a substantial net gain was due to a 94 per cent increase in sardine landings.

Production, by provinces, in 1941 and 1940 was as follows:

	1941	1940
	cwts.	cwts.
Nova Scotia.....	2,736,573	2,813,628
New Brunswick.....	1,772,408	1,450,551
Prince Edward Island.....	250,523	256,363
Quebec.....	916,616	976,702
British Columbia.....	5,418,891	5,906,896
Totals.....	11,095,011	11,404,140

The most noteworthy results of the year's operations in the sea fisheries were, of course, the production of a record pack of canned British Columbia salmon and a record pack of canned herring, already mentioned. An outstanding Atlantic Coast result was the great increase in New Brunswick sardine landings. All save a very small part of Canada's catch of sardine herring is taken in southwestern New Brunswick and the 1941 landings in that area totalled nearly 432,200 barrels, almost 209,200 more than were landed in the year before. They had a marketed value of \$2,797,000, an increase of over \$914,000.

Atlantic cod catch—the cod fishery is of first rank importance in the Atlantic provinces but of minor importance in British Columbia—increased by some 31,200 hundredweights and totalled more than 1,947,500 hundredweights, but the more striking gains were in the value of the catch to the fishermen and on the market. Landed value to the fishermen was \$4,037,200 or about \$1,001,500 more than in 1940. In the case of marketed value there was an increase of \$2,537,800, which brought the 1941 total nearly to \$7,455,600.

Halibut landings for the year, 149,525 hundredweights, were some 1,300 hundredweights larger than in 1940 and on the marketed value side there was an increase of \$566,300, which brought the money return to \$2,425,500. There is halibut fishing on both the Dominion's coasts but it is in Pacific waters that the great bulk of the catch is always made—approximately 129,300 hundredweights in 1941. British Columbia landings were somewhat larger than in 1940 but the Atlantic catch decreased. There was marketed value increase, however, both east and west.

Some figures as to lobster production, all of it from Atlantic waters, will be found in the table below. They show substantial increases both in size of catch and total marketed value. They show, too, that although the pack of canned lobster was 400 or so cases smaller than in 1940 it was worth \$212,000 more. Continued success by the packers in marketing their canned lobster, notwithstanding the loss of overseas customers because of the war, was traceable largely to the action taken by the Dominion to develop North American markets for a product which, in peace days, found sale mainly in Europe. Following is the table relative to results in this fishery:

	*Catch		*Shipped in Shell		*Canned		*Tomalley	
	Cwts.	Marketed Value	Cwts.	Marketed Value	Cases	Marketed Value	Cases	Marketed Value
		\$		\$		\$		\$
Nova Scotia.....	140,734	2,129,258	94,092	1,610,555	22,406	446,366	1,872	17,607
New Brunswick.....	58,850	1,041,987	30,484	560,649	13,430	313,006	748	7,275
Prince Edward Island.	59,951	500,592	7,057	92,504	18,090	393,253	1,398	14,835
Quebec, including								
Magdalen Islands....	18,488	186,896	6,797	68,187	4,591	96,867	131	1,536
(Magdalen Islands)..	17,535	174,723	5,922	56,950	4,552	95,931	131	1,536
Totals.....	278,023	3,858,733	138,430	2,331,895	58,517	1,249,492	4,149	41,253

* Figures for each of the four years 1937-1940 may be found in the annual departmental report for 1940-41, pages 8 and 9.

More lobster meat was marketed in 1941 than in 1940, or 4,775 hundred-weights as against 3,731, and its value was about \$236,100, an increase of over \$85,000. Firmer prices, as well as greater volume of business, contributed to the increase in total. Both Nova Scotia and New Brunswick marketed more meat than in 1940 and so did the Magdalen Islands, the only part of Quebec to engage in this trade. Prince Edward Island lobstermen dropped out of this branch of business in 1941.

DRIED FISH PRODUCTION

The improvement in the position of the dried fish industry which had been manifested in 1940 continued in 1941 when the production of dried fish and dried boneless fish by the industry, which is entirely an Atlantic coast enterprise, amounted to more than 282,500 hundredweights as against less than 251,000 hundredweights in the preceding year. The value increase was even more marked, with the total output worth very nearly \$2,539,000, or \$1,068,100 above the 1940 figures. Nova Scotia continued to be the principal producer with Quebec in second place. The following tables show, by provinces, the production and marketed value of dried fish and dried boneless fish combined, in 1941 and 1940, respectively:

PRODUCTION OF DRIED FISH

	1941		1940	
	Cwts.	Marketed Value	Cwts.	Marketed Value
		\$		\$
Nova Scotia.....	163,570	1,359,888	145,631	734,737
New Brunswick.....	23,947	197,427	25,271	152,912
Prince Edward Island.....	1,868	13,991	1,884	6,660
Quebec.....	685	566,311	44,118	266,204
Totals.....	254,070	2,137,617	216,904	1,160,513

PRODUCTION OF BONELESS DRIED FISH

	1941		1940	
	Cwts.	Marketed Value	Cwts.	Marketed Value
Nova Scotia.....	26,131	\$ 371,512	32,917	\$ 300,898
New Brunswick.....	1,393	18,322	938	8,561
Prince Edward Island.....	92	1,100	90	900
Quebec.....	849	10,443		
Totals.....	28,465	401,377	33,945	310,359

Inland Fisheries Results

As already said, the year's production from the fresh water fisheries exceeded the 1940 catch by a little more than \$1,724,000 in marketed value. So far as size of aggregate catch is concerned, there was a net increase of over 102,000 hundredweights, which brought the landings almost to 893,000 hundredweights. The gain in catch was due almost wholly to large landings in Manitoba, which totalled 417,200 hundredweights or nearly 110,800 more than in 1940. Small gains in Saskatchewan, New Brunswick and the Yukon were more than offset by decreases in Ontario, Quebec and Alberta. Save in Alberta, however, there was increase everywhere in marketed value, in the provinces where catch decreased as well as in those where landings increased.

Rated according to marketed value of the catches, the principal fish entering into fresh water production were whitefish, \$2,492,700; pickerel, \$1,253,400; saugers, \$1,038,500; trout, \$967,800; and pike, \$349,600. Catch and value were greater in each case than in 1940.

Total fresh water landings, by provinces, were as follows:

	Cwts.
New Brunswick	6,856
Quebec	51,904
Ontario	269,466
Manitoba	417,202
Saskatchewan	78,445
Alberta	68,552
Yukon	526
Total	892,951

FISHERIES EXPORT TRADE

Canada's exports of fisheries products in the calendar year 1941 showed an increase of about 31 per cent in value over those for 1940 and reached a total, roundly stated, of \$42,963,500. As compared with 1939, when fisheries export trade had reached the highest level in a decade, the 1941 business showed an increase of more than \$13,300,000.

The United States continued to be the best single export customer of the Dominion's fishing industry, but as a matter of fact the largest gain for the year was in the sales to the United Kingdom. In 1940 the exports to Great Britain were valued in all at slightly less than \$9,877,000 but in 1941 they rose to nearly \$15,349,000, an increase of about \$5,472,000. This gain was due, of course, to the large shipments of canned salmon and canned herring which were sent across the Atlantic to help meet Britain's urgent food needs. Canned salmon shipments to the United Kingdom, 47 per cent greater than in the preceding year, were worth \$10,405,000—using round figures here as in most other cases—as compared with \$5,613,000 in 1940. Well over three times as much canned herring was sent to Britain as in the year before and its value was \$3,618,000 as against \$1,141,000. Other exports to the United Kingdom consisted mainly of frozen cod, fish oil and fish meal.

Exports to the United States amounted to \$20,837,000, or about \$4,340,000 more than in 1940 and exports to countries other than Britain and the United States increased by slightly less than \$500,000 and totalled \$6,777,500.

Fisheries exports fall into five classifications and the following table shows the division of business between them for 1941 and for 1940:

	1941	1940
Fresh and frozen fish (incl. shellfish)	\$15,184,700	\$14,110,700
Canned fish (incl. shellfish)	18,442,400	11,669,000
Dried, pickled and smoked fish	5,885,100	4,063,400
Fish, seal and whale oils	1,784,200	992,400
Other fishery products (incl. meal)	1,666,900	1,826,400

As was to be expected, having in mind the great quantities of salmon and herring sent to the United Kingdom from the Dominion's canneries, the largest increase in 1941 export trade was in the business in canned fish. Here the value increase totalled more than \$6,773,000 and the quantity increase 555,800 hundredweights, which meant that the canneries' export shipments for the year amounted to slightly more than 1,350,400 hundredweights. In the case of value and quantity alike the increase was mainly to be credited to canned salmon and herring but there were gains also in the trade in such products as canned sardines, pilchards and lobster. The increase in canned lobster trade, of course, was with the United States and may be traced to the Dominion's efforts of the past couple of years to stimulate North American demand for lobster and thus to create adequate outlet to replace the markets lost in Europe as a result of the war. As a matter of incidental interest it may be added in passing that Canada's exports of canned salmon during the past year went to more than forty different countries and the exports of canned herring to more than thirty—striking testimony to the inability of the Axis powers to make good their threat to close the trade routes to the United Nations.

In the case of exports of dried, pickled and smoked fish, the net value gain amounted nearly to \$1,822,000. Something over one-half of this increase was in the trade in dried codfish, for while the war has had adverse effect on Canada's fisheries in some respects, it has also halted the export of dried fish in Iceland and Norway and thus has removed the severe competition which the Dominion's dried fish industry formerly had to face from these countries.

The 1941 gain in fresh and frozen fish—most of this business is done with the United States, of course—was \$1,074,000 and the increase in trade in miscellaneous products nearly \$160,000. In the latter instance, however, the increase was actually due to a sharp rise in shipments of one commodity, pilchard meal. Exports of this meal were worth \$681,000, or more than three times the 1940 figure.

The value of the exports of fisheries oils (fish, seal and whale oils) increased by over \$730,000 and amounted in all to \$1,691,200. Perhaps the outstanding development of the year in this regard was the rise in the exportation of cod liver oil one of the essential vitamin oils. In 1940 slightly less than 40,000 gallons of cod liver oil were shipped out of the Dominion but in 1941 the exports exceeded 138,400 gallons—an increase of 246 per cent. All save a comparatively small part of these cod liver oil exports went to the United States and Great Britain. The shipments to Britain, though not so large as those to the United States, reached substantial volume, although in 1940 Canada had sent the United Kingdom no cod liver oil at all. Exports of pilchard oil nearly trebled, both in quantity and value, with Australia, the United Kingdom, and the United States the principal importing countries. Exports of whale oil more than doubled in quantity and in value were three times as great as in 1940. In the case of miscellaneous fish oils, grouped together, there was a reduction in the quantity sent abroad but on the value side an increase of several hundred thousand dollars.

CANNED LOBSTER CONTROL

During 1941-42 the Canned Lobster Control Scheme was continued in operation, though with some modifications, to consolidate the ground gained in the previous year when the scheme was put in operation as an effort to avert the disastrous consequences to the lobster fishermen and canners which threatened to follow from the loss of overseas markets as a result of the war. The scheme had met with a very large measure of success in 1940-41 but it was felt that it would be well to continue to utilize it so that an adequate North American market for canned lobster might be firmly established. Under order in council the undersigned was again named to act as Controller for Canned Lobster and an Assistant Controller in Charge of Purchasing and an Assistant Controller in Charge of Sales were also named. Under the order in council the controller was empowered to buy and market not more than 30,000 cases (48-pound cases, so-called) from the 1941 pack. He was authorized to pay to producers prices varying from \$15 to \$20 a case, according to the quality of the product and the state of the market. Authority was also given him, and exercised, to carry on a canned lobster advertising campaign within the Dominion, with a view to stimulating the sales of Canadian canned lobster generally, not simply the lobster which he himself might market.

Although the maximum price which the controller was empowered to pay producers was \$20 a case, market demand for canned lobster in the Dominion and the United States had been so increased by the operations under the control scheme in the preceding year that packers found it possible in 1941 to obtain more than \$20. As a result, most of them chose to handle their own marketing rather than to sell their output through the controller and only approximately 1,750 cases were offered to and purchased by the controller from the year's pack of between 58,000 and 59,000 cases. Market demand was so brisk that all of the year's pack was disposed of well in advance of the beginning of the 1942 canning season. Indeed, it is understood that some orders could not be completely filled. It is also to be noted that not only were the packers enabled to market their output on satisfactory terms but that as a result of the control scheme the lobster fishermen received increased returns from their fishing operations.

It is not expected that it will be necessary to continue the control scheme during 1942-43. Demand for canned lobster has been so built up in Canada and the United States during the two years that the scheme has been operated that the industry should itself be able to dispose of its pack in this market without governmental assistance. This state of affairs exists notwithstanding that in pre-war days, before the control scheme was put into effect, only a relatively small part of the Canadian pack was sold on this side of the Atlantic. At that time eighty per cent or more of the annual output was sold to Great Britain and continental Europe. From the latter figure it may be seen how disastrous the position of the canned lobster industry would have been, when war closed the European markets, had it not been for the control scheme and its success in developing North American demand.

FISH CULTURE

Fish cultural operations in 1941 were carried on by the department in Nova Scotia, New Brunswick and Prince Edward Island, where the fisheries are entirely, or to a large extent, under federal administration. Thirteen main hatcheries, one subsidiary hatchery, six rearing stations, six salmon retaining ponds and several egg-collecting camps were operated. Only the more important freshwater and anadromous food and game fishes such as Atlantic and seabago salmon and speckled, rainbow and salmon trout were propagated. In addition over 1,000,000 sockeye salmon eyed eggs were planted in Hillier Creek, tributary to Maggie Lake, Vancouver Island, in continuation of the stocking effort, resumed in 1937, to add these waters to the sockeye producing areas of the

Barkley Sound district. The total output from all establishments in 1941 was 29,635,150 in various stages of development up to adult fish.

A detailed report on fish cultural operations for the year is to be found in Appendix No. 3.

FISHING BOUNTY

During 1941 fishing bounties totalling \$159,959.60 were paid on the Atlantic coast to the owners and crews of 9,080 fishing boats and the owners and crews of 608 fishing vessels. Payments were made under authority of "An Act to Encourage the Development of Sea Fisheries and the Building of Fishing Vessels." Fishermen making up the crews of the boats which shared in the bounty payments numbered all told 15,564 and the vessel fishermen number 3,096.

By provinces the bounty payments totalled: Nova Scotia, \$78,551.60; New Brunswick, \$19,663.60; Prince Edward Island, \$10,563.40; Quebec, \$51,181.

Bounty payments under the authorizing Act are made from year to year but there is some variation in the basis of distribution from time to time. The basis in 1941 was as follows: (1) To owners of vessels entitled to receive bounty \$1 per registered ton, payment to the owner of any one vessel not to exceed \$80; (2) To vessel fishermen entitled to bounty, \$7.90 each; (3) To owners of fishing boats having not less than a twelve-foot keel, \$1 per boat; (4) To boat fishermen entitled to bounty, \$7.40 each.

Details of the 1941 distribution are shown in the following table:

1941 - 1942

Province and County	Boats	Men	Amount	Vessels	Tons	Average Tons	Men	Amount	Total Amount
			\$ cts.					\$ cts.	\$ cts.
<i>Nova Scotia—</i>									
Annapolis.....	151	232	1,867 00						1,867 00
Antigonish.....	113	168	1,358 80						1,358 80
Cape Breton.....	204	318	2,543 60	29	450	16	130	1,473 00	4,016 60
Cumberland.....	4	4	33 60						33 60
Digby.....	285	498	3,967 80	34	461	14	73	1,037 70	5,005 50
Guysborough.....	461	718	5,771 00	33	465	14	106	1,298 40	7,069 40
Halifax.....	676	877	7,144 20	31	607	20	139	1,703 10	8,847 30
Inverness.....	208	553	4,279 40	7	77	11	37	369 30	4,648 70
Kings.....	51	56	465 40						465 40
Lunenburg.....	567	685	5,625 60	61	3,407	56	1,096	12,037 40	17,663 00
Pictou.....	24	40	313 40						313 40
Queens.....	150	226	1,808 00	12	152	13	47	522 30	2,330 30
Richmond.....	400	683	5,435 80	11	132	12	29	361 10	5,796 90
Shelburne.....	569	859	6,887 20	93	1,571	17	387	4,622 30	11,509 50
Victoria.....	228	347	2,786 20	12	171	14	38	471 20	3,257 40
Yarmouth.....	97	196	1,534 60	76	1,107	15	218	2,829 20	4,363 80
Totals.....	4,193	6,460	51,826 60	399	8,600	22	2,300	26,725 00	78,551 60
<i>New Brunswick—</i>									
Charlotte.....	193	353	2,778 00	14	182	13	42	513 80	3,291 80
Gloucester.....	428	786	6,190 80	125	2,325	19	499	6,257 10	12,447 90
Kent.....	172	292	2,328 80	9	97	11	24	286 60	2,615 40
Northumberland.....	27	46	401 00	11	115	10	21	280 90	681 90
Restigouche.....	2	4	31 60						31 60
Saint John.....	11	14	114 60						114 60
Westmoreland.....	26	49	480 40						480 40
Totals.....	859	1,544	12,325 20	159	2,719	17	586	7,338 40	19,663 60
<i>Prince Edward Island—</i>									
Kings.....	242	325	2,625 40						2,625 40
Prince.....	424	769	5,997 80						5,997 80
Queens.....	139	246	1,940 20						1,940 20
Totals.....	805	1,340	10,563 40						10,563 40
<i>Quebec—</i>									
Bonaventure.....	376	700	5,527 20	11	117	11	44	464 60	5,991 80
Gaspé.....	2,035	4,070	32,026 60	39	463	12	166	1,773 40	33,800 00
Matane.....	133	242	1,876 60						1,876 60
Saguenay.....	679	1,208	9,512 60						9,512 60
Totals.....	3,223	6,220	48,943 00	50	580	12	210	2,238 00	51,181 00
Grand Totals.....	9,080	15,564	123,658 20	608	11,899	20	3,096	36,301 40	159,959 60

NOTE.—A number of "late" claims amounting in all to \$7,021.90 which are included in this statement are for the season of 1940. As the basis of distribution for 1940 differed from that of 1941, a number of the figures in the "Amount" columns do not, as a result, balance with the number of claims paid.

INTERNATIONAL FISHERIES COMMISSION, 1941

With the close of the 1941 halibut fishing season, the International Fisheries Commission completed its tenth year of successful regulation of the Pacific halibut fishery. It continued the investigations of the fishery and of the stocks of halibut which have been found indispensable to rational regulation.

Meetings of the Commission were held at Vancouver on June 12 and at Seattle on November 27, 28 and 29. During these sittings the condition of the fishery and the programs of investigation and regulation were considered.

On November 28, the Commission met with the Conference Board, composed of representatives of the halibut fishermen's and vessel owners' organizations of British Columbia, Washington and Alaska. At this conference, the results of the conservation measures adopted by the Commission were discussed and recommendations for the regulation of the fishery in 1942 were received from the fleets.

A report upon the results of hearings, conducted by the Commission late in 1940, was transmitted to the governments of Canada and the United States. The hearings were held at the request of the two governments to ascertain the present attitude of all the halibut fleets toward a proposal for a supplemental treaty advanced in 1938 at the fleets' urgent request for legal support of their voluntary system of control of the rate of halibut landings.

The halibut fishing regulations for the 1941 season were revised for purposes of clarity. No important changes in regulatory or enforcement procedure were made. The Area 2 catch limit of 22,700,000 pounds was retained. The catch limit of Area 3, whose stock showed further improvement, was increased 1,000,000 pounds from 25,300,000 to 26,300,000. The period of validity of permits for the retention of halibut caught incidentally during fishing for other species with set lines in areas close to halibut fishing was extended to 20 days after the closure of the last area open to halibut fishing. The opening date of the 1942 season was set as midnight of April 15.

Due largely to increases in the number of vessels fishing, the catch limits of Areas 2 and 3 were attained earlier in 1941 and the fishing season was shorter than in any previous year. Fishing began on April 1, as in 1940. The grounds south of Cape Spencer, Area 2, were closed at midnight of June 30, 13 days earlier than in 1940. Area 3, west of Cape Spencer, was closed at midnight of September 14, 12 days earlier than the previous year. As provided in the regulations, Areas 1 and 4 were closed at the same time as Areas 2 and 3, respectively. Permits for the retention of halibut caught incidentally during other fishing in areas closed to halibut fishing became invalid at midnight of October 4.

The total catch of halibut on the Pacific coast in 1941 was 52,096,000 pounds. Of this, 343,000 pounds was reported from Area 1, south of Willapa Harbor, Washington, 23,846,000 pounds from Area 2 and 27,907,000 pounds from Area 3. No catches were made in Area 4 which includes the waters around the Aleutian Islands and in Bering Sea. The Area 2 catch included 510,204 pounds landed under permit to retain halibut caught incidentally during fishing for other species in the area after closure.

The statistical and biological investigations, that have been found indispensable to the intelligent regulation of the fishery, were continued by the Commission. Changes in the fishery and in the condition of the stocks were measured and analysed to determine the success of past regulation and the proper course of future regulation. Biological investigations at sea made necessary the charter and operation of a vessel.

The abundance of halibut, as shown by the catch per unit of fishing effort, was greater in Area 3 than in 1940 but failed to increase in Area 2. The average catch per skate in Area 3 increased from 116 pounds to 122 pounds. It declined from 63 to 62 pounds in Area 2. However, the catch per skate in Area 2 and

Area 3 in 1941 was 79 per cent and 89 per cent greater, respectively, than it was in 1930, when the stocks of halibut reached the poorest condition in their history, due to unrestricted fishing.

The condition of the spawning stock in Area 2 was studied by means of quantitative determinations of the abundance of halibut eggs and larvae produced on the important spawning grounds in the vicinity of Cape St. James, British Columbia. A halibut vessel which was chartered shortly before the end of December, 1940, was operated until the middle of March, 1941. During the charter period, a total of 399 quantitative net hauls were made at 158 stations which had been sampled in the same manner in each of the preceding eight winters. Hydrographic samples, for the determination of the currents and water conditions in the spawning area, were taken at 12 stations. Similar operations were again undertaken early in December and continued into 1942.

A preliminary analysis of the eggs and larvae, caught in Area 2 during the 1940-41 spawning season, has been made and the results compared with those of previous years. The comparison indicates that the production of spawn was practically the same as during the previous season and that the partial recovery in spawning, following the sharp declines of 1936-37 and 1937-38, was sustained. However, the production of spawn in Area 2 was not large, proving that the spawning stock there is still very limited.

Investigation of the composition of the stocks of adult halibut was continued to determine the changes produced by regulation. Measurements were taken of more than 75,000 fish in the market catches from representative fishing grounds, 43,000 from banks off the coast of British Columbia in Area 2, and 32,000 from the banks off Alaska in Area 3. These measurements showed that spawners were very abundant in Area 3 but were still relatively scarce in Area 2.

Determination of the changes in the age-composition of the adult stocks, a more exact method of measuring the changes that occur, was begun, using materials collected incidentally during the taking of market measurements. When this is completed, it will accurately relate the changes that have occurred in the stocks to the years in which the changes originated and thus to the events which caused them.

The economic condition of the Pacific halibut fishery has improved greatly under regulation. The 1941 catch was 9,000,000 pounds greater than that taken by the unrestricted fishery in 1931, the year immediately prior to the beginning of regulation, and was taken with 22 per cent less fishing effort. The catch can be materially increased and the amount of effort required to secure it can be further reduced by a continuation of intelligent regulation.

The members of the Commission are: Messrs. L. W. Patmore, Victoria, B.C., and A. J. Whitmore, Department of Fisheries, Ottawa, Ont., representing Canada, and E. W. Allen, Seattle, Washington, and C. E. Jackson, United States Fish and Wildlife Service, representing the United States. Mr. Patmore was the Chairman and Mr. Allen the Secretary of the Commission during 1940 and 1941. At the November meeting of the Commission, Mr. Allen was elected the Chairman and Mr. Patmore the Secretary for the years 1942 and 1943.

INTERNATIONAL PACIFIC SALMON FISHERIES COMMISSION

The International Pacific Salmon Fisheries Commission was established in the fall of 1937 under a Convention between the United States and Canada for the protection, preservation and extension of the sockeye salmon fisheries of the Fraser River system. The season of 1941 was therefore the fourth year of work by the Commission. It was the final year of the first four-year cycle. At the end of a second such cycle the Commission is charged with the duty of regulating the sockeye fishery. At present it is charged with investigation of, and recommendations for, the removal of obstructions with whatever measures are necessary to improve propagation on the spawning grounds.

The Commission met during 1941 in June and in November. At the last meeting Mr. Tom Reid, M.P., of New Westminster, B.C., was elected Chairman and Mr. B. M. Brennan, of Seattle, Wash., retired as his term of two years had elapsed. Mr. Edward W. Allen, of Seattle, Wash., was elected Secretary in Mr. Reid's place. The other commissioners are Messrs. A. J. Whitmore, of the Department of Fisheries, Ottawa, Charles E. Jackson, of the United States Fish and Wildlife Service, and A. L. Hager, of Vancouver.

During the year the first outstanding results of the Commission's investigations were obtained. Extensive tagging experiments had been carried on to follow the migration of sockeye from salt water to their spawning grounds. It was found during each of the years 1938, 1939, and 1940 that these migrants were delayed at a point on the Fraser River called Hell's Gate Canyon, about 125 miles up the river. During 1941 the investigations were intensified with the purpose of determining the mortality which may have resulted from this delay, a very difficult task. One of the most extensive tagging experiments of its kind resulted in the marking of 13,537 sockeye immediately below the obstruction and 921 above over a period of nearly six months.

The recovered tags showed that the river at this point was not passable for sockeye at the levels of 25 and 40 feet as shown on the gauge established at Hell's Gate. The first period of the blockage lasted 36 days. The river then became passable for one or two days and in this brief period there passed the major share of all spawning fish to reach the upper Fraser in 1941. It is estimated that more sockeye died below the obstruction than passed through. It was also shown that sections of the runs to different spawning grounds were lacking corresponding to the portion of the run which should have passed the Gate at the time of the blockade. Some races suffered severely, others less so.

The Commission reported that the spawning grounds above the obstruction were fairly well seeded in places as compared with recent years. The run of sockeye seems able to maintain the remnants now there and to endure in addition a heavy mortality at the obstruction. If so, it seemed probable that the stock of fish now originating in the upper Fraser has a high rate of reproduction, possibly due to the understocking of the grounds. This is a most encouraging augury of rapid recovery of the former great runs, once the obstruction is removed and proper care taken to guard against overfishing and other dangers.

The Commission proceeded at once to take such steps as were necessary in planning for removal of the obstruction and to pass the sockeye in the interim before plans for its removal could be approved and completed. It arranged for a thorough study of the obstructed section of the river, proposed a temporary fish pass to be cut through the rock, and prepared plans for capture and transportation of blockaded adults through a flume. The last named salvage operation—that of capture and transportation in a flume—will be in effect during the season of 1942.

The detection of this obstruction and the measurement of its effects has been possible only through a thorough and complete program of research, requiring each section of the Commission's existing program. The success of the work has given the Commission the serious responsibility of seeing to the removal of this obstruction and the rehabilitation of the runs affected by it.

The normal program of the Commission was carried on as usual during the year, since most of it was directly necessary for the investigations at Hell's Gate.

During the season of 1941 sockeye were tagged at Sooke traps and by three vessels stationed at various points in Puget Sound and the Gulf of Georgia. All told, 5,586 fish were thus tagged in salt water, in addition to those tagged as described above at Hell's Gate Canyon.

During 1941 statistics were collected in the canneries in preparation for the coming regulations by observers stationed at Steveston, B.C., and Anacortes, Washington. The usual surveys of the spawning grounds were carried on for the recovery of salt water and Hell's Gate tags, for determination of the escapement, and various scientific observations. The intensive study of the Harrison system for the purpose of developing methods of counting spawners was this year completed. Other work bearing on rehabilitation was carried on at Cultus Lake and in Quesnel. At Cultus Lake the adult migrants numbered 18,164, the second age group seaward migrants 3,959,490. At Quesnel, careful study was begun on possible methods of rebuilding the former very great run to that district. During the season the largest share of the spawning, estimated at 73 per cent, was at Chilco where a thorough examination of spawners was carried on. The run to Adams River, fortunately a small or "off-year" run, was apparently adversely affected by the unfavourable conditions at Hell's Gate, only 34 fish being counted there.

D. B. FINN,

Deputy Minister of Fisheries.

APPENDIX No. 1

**REPORT OF COLONEL A. L. BARRY, CHIEF SUPERVISOR OF
FISHERIES, EASTERN DIVISION, FOR THE CALENDAR YEAR
1941 ***

Total landings of all species of fish taken in the division during the year were greater than in 1940 by almost 24,000,000 pounds. Landed value total increased by over \$2,300,000 and the increase in marketed value was approximately \$5,000,000. Both in New Brunswick and the Magdalen Islands aggregate catches increased over those of last year but in Nova Scotia and Prince Edward Island they decreased. All told, the amount of fish and shellfish landed in the division was 476,213,000 pounds, with a landed value of \$10,936,000, as compared with 452,303,000 pounds, with a landed value of \$8,605,000 in 1940.

THE COD FISHERY

Cod landing increased by over 2,000,000 pounds. Catches showed gain in Nova Scotia, New Brunswick and the Magdalen Islands, but the Prince Edward Island catch decreased. Total divisional catch of cod was 157,215,000 pounds, and its landed value \$3,115,183, as compared with 155,113,400 pounds and \$2,344,388 in 1940.

THE LOBSTER FISHERY

There was an increase of slightly over 1,000,000 pounds in the catch of lobsters when compared with last year, 879,900 pounds of it in Nova Scotia. Increases occurred in the four counties of Cape Breton Island (and losses of gear during the season were relatively light) and a further increase of 733,100 pounds in the eastern Nova Scotia mainland but the catch in the western mainland decreased by 653,200 pounds. The New Brunswick catch decreased by 237,500 pounds because of a drop in Northumberland Straits production; catch in the Bay of Fundy section of New Brunswick was slightly above that of last year. There were increased landings in Prince Edward Island and the Magdalen Islands. The total number of fishermen engaged in lobstering in the division was 12,523 as compared with 14,716 in 1940.

THE SARDINE FISHERY

In the sardine fishery, which is confined to the Bay of Fundy section of New Brunswick, the catch was nearly double that of 1940. The increase in landed value, or value to the fishermen, amounted to over \$563,000. Total landings were 86,433,000 pounds, with a landed value of \$922,958, as compared with 44,596,000 pounds, with a landed value of \$359,493 in 1940.

THE HADDOCK FISHERY

In Nova Scotia, where the bulk of the haddock catch is taken, there was a decrease of 6,137,000 pounds in haddock landings, and in the division as a whole a drop of 6,742,000 pounds. The virtual failure of the spring fishery at Ingonish contributed to the Nova Scotia reduction. Landings at Halifax were less than last year, while in Halifax County west and in Guysboro they increased. Haddock landings along the western section of the province decreased by 2,557,800 pounds.

* In general, such production and value statistics as are included in this appendix are given in round figures only. Exact figures may be found in the paper known as Fisheries Statistics of Canada, 1941.

OTHER FISHERIES

There were decreased catches in the mackerel, herring, smelt, swordfish, halibut, hake and cusk, and pollock fisheries. The largest single decrease was in the case of herring—a drop of over 10,100,000 pounds. The scallop catch increased by 11,920 gallons (shelled) in the Bay of Fundy section of Nova Scotia, where most of the scallops were taken, but a decrease in the catch on the New Brunswick shore cut the net gain for the division to 11,695 gallons.

Nova Scotia

The total production of all varieties of fish and shellfish in Nova Scotia decreased by 7,706,000 pounds. Returns to the fishermen, however, increased by \$1,131,000 and the marketed value by \$2,791,000.

Cod landings increased by 1,375,000 pounds, notwithstanding catches fell off in Cape Breton Island and the eastern mainland. In the western mainland there was a gain of nearly 6,000,000 pounds, with the bank fishing fleet accounting for slightly over 2,000,000 pounds of the increase. Lobster landings increased by 879,900 pounds, as already noted. Herring, salmon and scallop catches each increased. The largest single decrease occurred in the haddock fishery. The spring run of haddock was almost a complete failure, particularly in the Ingonish area, but more fall fish were taken at both Ingonish and North Sydney than in 1940. Landings at Halifax during the year were approximately 900,000 pounds below those of 1940. There were reductions in the catches of mackerel, halibut, swordfish, hake and cusk, smelts and pollock.

The table shows total Nova Scotia catch for 1941, landed and marketed values, and information concerning production and value of the principal varieties:

Total quantity of all fish landed.....	pounds	273,657,000
Total landed value.....	\$	6,931,650
Total marketed value.....	\$	12,634,832

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	14,073,400	1,676,447	2,129,258
Cod.....	132,057,700	2,687,747	5,500,881
Haddock.....	27,778,000	714,082	1,361,488
Mackerel.....	23,658,800	439,623	738,591
Halibut.....	1,776,900	199,769	283,887
Swordfish.....	1,346,300	217,830	259,461
Herring.....	27,799,800	211,044	699,084
Salmon.....	606,800	91,304	115,381
Hake and Cusk.....	10,712,700	110,170	202,417
Scallops (gallons).....	65,030	143,935	162,873
Smelts.....	749,300	47,661	52,426
Pollock.....	8,086,800	108,292	192,601

New Brunswick

Total landings in New Brunswick, including catch from the inland areas, was 32,194,000 pounds greater than in 1940—a condition due to the increase of nearly 42,000,000 pounds in the catch of sardines. The catch of lobsters was 237,500 pounds less than in 1940, the decrease occurring in the Northumberland Strait section. The smelt catch was 790,900 pounds less than that of last year. Herring catches decreased in both sections of the province, and the total reduction was 10,144,400 pounds. Salmon, cod, hake and cusk catches increased, while catches of shad, alewives, clams and haddock decreased. The oyster catch increased by 1,349 barrels, with the gain occurring in the Richibucto, Miramichi, and Gloucester County areas.

The commercial catch of the inland or freshwater district, which is included in the provincial totals, was 685,600 pounds with a landed and marketed value of \$26,570, as compared with 677,200 pounds with a value of \$25,656 in 1940.

The table below shows total New Brunswick catch, landed and marketed values for 1941 and data concerning the principal varieties:

Total quantity of all fish landed.....	pounds	177,926,400
Total landed value.....	\$	2,827,551
Total marketed value.....	\$	6,484,831

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	5,885,000	634,544	1,041,987
Sardines.....	86,433,000	922,958	2,797,072
Smelts.....	4,691,800	266,142	408,972
Herring.....	41,732,500	202,067	795,746
Salmon.....	1,717,000	219,442	275,160
Cod.....	13,899,900	225,343	408,139
Shad.....	1,299,200	36,566	42,966
Alewives.....	3,061,200	20,277	52,743
Oysters.....	2,512,800	76,531	108,678
Clams.....	6,602,300	52,956	144,443
Haddock.....	985,900	31,291	48,190
Hake and Cusk.....	3,232,900	34,602	59,768

Prince Edward Island

There was a decrease of 584,000 pounds in the year's total production of fish and shellfish in Prince Edward Island. Total landed value increased by \$204,844 and marketed value by \$237,156. The lobster catch increased by 435,200 pounds and its landed value by \$115,236. Cod landings decreased but the value to the fishermen increased by \$13,198. An increase of 1,123,200 pounds occurred in the mackerel catch with the landed value increasing by \$31,430. The oyster catch increased by 1,269 barrels and there was a rise of over \$17,200 in landed value; most of the oysters were taken from private beds in the Malpeque area and the quality, for the most part, was high. Smelt catch decreased by 199,800 pounds and the landed value by \$2,146.

The table below shows the total catch for Prince Edward Island for the year, landed and marketed values and information concerning the principal varieties:

Total quantity of all fish landed.....	pounds	25,052,300
Total landed value.....	\$	758,464
Total marketed value.....	\$	952,026

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	5,995,100	469,153	500,592
Cod.....	4,819,900	73,343	112,405
Mackerel.....	2,644,400	43,747	79,846
Oysters.....	1,091,800	43,377	53,602
Smelts.....	861,800	41,575	53,122
Hake and Cusk.....	3,966,700	36,803	69,928
Herring.....	4,699,900	34,505	51,395

Magdalen Islands

The Magdalen Islands' aggregate catch increased by 1,476,000 pounds. Cod landings increased by 1,633,700 pounds with an increase of \$74,314 in value

to the fishermen and the catch of lobsters increased by 21,500 pounds and by \$22,900 landed value. The catches of herring and mackerel were below those of 1940. The landed value of the mackerel catch increased by \$82,300, however, and the landed value of the herring catch decreased by only a few dollars.

The table below shows total catch, landed and marketed value for the Magdalens for 1941, and information touching the principal varieties:

Total quantity of fish landed.....	pounds 26,231,500
Total landed value.....	\$ 418,416
Total marketed value.....	\$ 707,129

	Lbs.	Landed Value	Marketed Value
		\$	\$
Cod.....	6,437,500	128,750	169,674
Lobsters.....	1,753,500	122,018	174,723
Mackerel.....	6,850,600	118,324	240,083
Herring.....	10,634,600	17,554	113,591
Smelts.....	42,300	3,443	3,807

SPORT FISHING

Nova Scotia.—Salmon angling during the year was considerably better in Cape Breton Island than during the previous year, but not so good on the eastern mainland of Nova Scotia. In this latter section the number of fish taken was considerably below that of last year. In the western mainland section angling was good during the early part of the season but water levels became too low for satisfactory fishing during the latter part of the season. Generally speaking trout fishing was fairly good throughout the season and the usual catches were made.

New Brunswick.—In New Brunswick salmon angling conditions were satisfactory during the entire season, with heavy rainfalls keeping the waters at high level. In Westmorland County there were 40 salmon caught on the Gaspereau River early in June and 20 on the Scoudouc, while in 1940 none were reported from these areas. Catches were above those of last year except in a few sections and in the latter areas the decreases were due to reduced numbers of anglers rather than scarcity of fish. Trout fishing in both the eastern section of the province and the Bay of Fundy section was better than in 1940 and satisfactory catches were made.

Prince Edward Island.—Trout fishing generally was not as good as in the previous year although water conditions were for the most part favourable. In Prince County fair catches were taken during the early part of the season. In northern Queens County fishing was generally poor, while in southern Queens and in Kings County fair results were reported. In northern Kings the season was very wet and the trout catches were not as large as in 1940.

FISHERIES PATROL SERVICE

Nova Scotia.—In the Cape Breton Island section the usual patrol was carried out in lobster fishing district 6A, with satisfactory results. Along the eastern mainland patrol was carried out by the department-owned boat *A. Halkett*, assisted by the patrol boat *No. 666* and a small chartered boat in the Malagash area. In the western section, patrol was carried out by the department-owned boats *Gilbert* and *Capelin* assisted by a chartered boat in the Yarmouth area.

New Brunswick.—In the Bay of Fundy section the department's boats *Thresher* and *Gannet Rock II* were again employed throughout the year. In the Northumberland Strait section a fleet of four chartered boats was engaged and were on duty from the end of April until the end of November.

Prince Edward Island.—In Prince Edward Island six patrol boats were engaged. One was the department-owned *Capitol* and the others were boats chartered for duties in the several sections of the island.

Generally speaking, the patrol services throughout the division gave effective protection during the fishing seasons.

INSPECTIONS UNDER THE FISH INSPECTION ACT

Supervisor Robert Gray, who is directly responsible for the work under the Fish Inspection Act in this division, reports that during the year four reinspections were required—two small lots of herring caught on the Bay of Fundy shore of Nova Scotia and two small lots of mackerel from the Magdalens. The fact that only four reinspections were necessary indicates that there has been a general improvement in the quality of pickled fish during the year. While the total number of inspections was below that of 1940, the number of inspections of premises increased. More attention has been given to the sanitary conditions of vessels, fish houses, utensils, etc.

In the production of Scotch-cured herring during 1940 several cases occurred in which the dealers required the fishermen to cure full fish as "Matjes", with the result that these fish, being too lightly salted, did not keep. This mischance had a tendency to discourage some of the producers who, this year, either sold their herring fresh or cured them by the split method. A total of 2,610 barrels was cured by the Scotch process and these met with a good reception with remunerative prices being obtained in Canadian and American markets.

Frozen smelt grading, which formerly had obtained only in New Brunswick, was extended to Quebec, Prince Edward Island and Nova Scotia. This step was well received by the trade and welcomed in the export markets.

A rigid system of culling, cleaning and grading of oysters for size and shape was set up, which greatly improved prices to the local dealers and gave much satisfaction to the importers in Quebec and Ontario.

Boneless cod inspection, although not compulsory, was made available to dealers. Some who asked for and received inspection of their fish had the satisfaction of receiving a higher price than was generally paid for uninspected fish.

REDUCTION OF FISH WASTE AND COARSE FISH

During the year sixteen firms in the division produced fish meal and oil, or one more than in the previous year. Eleven operated in Nova Scotia, four on the Bay of Fundy shore of New Brunswick and one on the New Brunswick north shore. One new plant was placed in operation at North Sydney, N.S. In addition to these 16 plants, another at Halifax produced a quantity of fox feed.

LOSS OF LIFE AND FISHING GEAR

It is regretted that 17 fishermen lost their lives during the year as the result of accidents which occurred in the course of their operations. Eleven were from Nova Scotia and six from New Brunswick. In addition, four men were drowned while angling for sport fish in Nova Scotia. Loss of fishing gear and damage to gear was considerably less than in 1940. The estimated value of gear destroyed was \$100,000 as compared with \$318,000.

FISHING FLEETS

In Cape Breton Island the fishing fleet was smaller than in 1940, with a decrease of 66 in the number of vessels operated and a decrease of 194 boats. The decreases were largely due to owners having enlisted in the armed forces or turning to other industries. On the other hand, the number of vessels fishing from Halifax and Canso increased, the total being thirty-eight vessels as compared with 22 in 1940. However, there was a sharp reduction in the number of craft engaged in the inshore fisheries, there being 24 small vessels less than last year, 218 gasoline boats less and 205 row and sail boats less. Three new vessels were added to the offshore fleet operating out of Lunenburg and two vessels of this fleet were lost during the year. The fleet made its regular trips to the banks and the table below shows the catches for the various trips as compared with 1940 landings:

Trip	1941		1940	
	Vessels	Quintals	Vessels	Quintals
Frozen baiting.....	5	3,400	9	6,400
Spring trip.....	16	20,600	11	9,200
Summer trip.....	26	67,000	19	54,750
Fall trip.....	1	700	1	1,500
.....		91,700	.....	71,850

There was an increase of five boats in the scallop fleet operated out of Digby. These were not new boats but ones which had been reconditioned after several years' tie-up.

In New Brunswick the salmon driftnet fleet was reduced from 181 to 146 vessels. The cod fishing fleet was about the same as in 1940 with eight new boats added to the Gloucester County fleet. The latter were boats equipped with twenty-five-horsepower engines and carrying a crew of four or five men. Their operation proved fairly satisfactory.

EDUCATIONAL WORK

During the year in addition to technical instruction given to fishermen by departmental officers, the program of adult education to assist fishing groups to build their organization and promote joint action was continued under the department's arrangements with St. Francis Xavier University. Short courses, each of one week's duration, were held at fourteen centres and were attended by 564 fishermen, selected as likely to give leadership in their respective communities. Much interest was shown not only by fishermen but also by the people of the localities where the courses were held. Literature for study clubs was supplied and advice given on particular activities groups might have it in mind to undertake. The benefit derived from the educational work was reflected in the growing volume of business, buying and selling carried on by the organized fishermen's groups during the year.

The brisk demand and increased prices for nearly all varieties of fish and fish products, while the action of the Wartime Prices and Trade Board prevented offsetting increases in gear prices, did much to make the lot of the fishermen a happier one in 1941 and give encouragement for the future. Heavy enlistments of fishermen and other fishery workers in the armed services, and the movement of workers to war construction projects and factories, have caused difficulty to producing firms, however, and for the first time since the war started many of them have experienced a shortage of plant labour, due more to the freezing of wages at the old levels than to direct shortage of manpower.

In September a conference at Shediac brought together all the supervisors and inspectors of the division for the first time in nine years and did much to build up esprit-de-corps and unity in staff, as well as evolving useful suggestions to the department on various administrative matters. A closing dinner-meeting, attended by the Minister of Fisheries and his deputy, and representatives of the governments of the three Maritime Provinces and the Maritime Board of Trade, assisted toward a fuller and cordial understanding of the problems of Maritime fishermen and common effort in seeking their solution.

The chief supervisor is pleased to report an increase in the spirit of co-operation not only among organized groups of fishermen but among independent dealers as reflected in a representative conference of the United Maritime Fishermen, meetings of the Dry Salt Fish Exporters' Association, the boneless cod producers and the oyster producers. It is hoped that such gatherings may be continued and expanded.

The loyal support afforded the chief supervisor by all the permanent and temporary employees of the division and the assistance given by members of the staff of the Fisheries Research Board of Canada has been sincerely appreciated.

APPENDIX No. 2

ANNUAL REPORT OF THE CHIEF SUPERVISOR OF FISHERIES
(MAJOR J. A. MOTHERWELL) WESTERN DIVISION (BRITISH
COLUMBIA) FOR 1941 *

The year 1941 has been noteworthy in that the packs of canned salmon and canned herring exceeded any previous record. The returns, particularly to those engaged in catching the fish, were unusually satisfactory and especially so in the case of salmon gillnetters and trollers.

The pack of all varieties of canned salmon reached the total of 2,248,870 cases, which exceeds the previous record pack of 1930 by 27,087 cases and is greater than the average of the past five years by 554,438 cases, as shown by the following statement:

	Cases
1922-1926	1,633,065
1927-1931	1,540,744
1932-1936	1,467,815
1937-1941	1,694,432

Apart from the pink variety in certain sections, the supplies of all species of salmon were found to be abundant and notwithstanding the large pack very satisfactory quantities reached the spawning grounds.

SOCKEYE

The pack of sockeye, 455,297 cases, has only been exceeded in the last twenty-six years by the 1930 output and then only by 22,381 cases. This year's pack exceeds the average of the past five years by 82,334 cases, as will be seen by the following details:

	Cases
1922-1926	346,700
1927-1931	312,404
1932-1936	337,162
1937-1941	372,963

Naas River Area.—The pack of 24,876 cases compares with 28,562 in 1936 and 17,590 in 1937.

Skeena River Area.—The total of 81,183 cases compares with 81,960 in 1936 and 41,023 in 1937.

Rivers and Smiths Inlets.—The combined total of these two inlets reached 115,342 cases, compared with 59,138 cases in 1936 and 108,170 cases in 1937.

It will be remembered that in recent years the number of salmon gillnet boats operating in this area has increased considerably, resulting in a smaller return to the fishermen individually. In the year under review, it is gratifying to observe the number of fishing boats was reduced from 1,896 to 1,355, a reduction of 541 from the number operating the previous year. This fact, together with the good run of salmon, provided a profitable season for the fishermen.

Fraser River Area.—There was a most gratifying increase in the sockeye catch in this district. The pack of sockeye running to the Fraser River reached a total of 149,716 cases, compared with 66,583 cases in the brood year of 1937, or an increase of 83,133 cases.

* For reasons of economy some material of a type included in earlier annual reports has this year been omitted. Complete detailed figures relative to British Columbia production in 1941 will be found in Fisheries Statistics of Canada, 1941.

By Statement No. 12 it will also be observed that the catches in the Juan de Fuca Strait and Puget Sound area of sockeye heading for the Fraser also show a considerable increase, the pack from the totals caught at the Fraser, in Juan de Fuca Strait, and in Puget Sound amounting to 269,883 cases, compared with 132,994 cases in the brood year, 1937.

Notwithstanding the increased catch, the spawning grounds in the Fraser River watershed, apart from the Shuswap area, showed a satisfactory seeding. This was particularly the case in the Chileo area, where the supply of spawners increased from 110,000 in the brood year of 1937 to 350,000 in 1941.

COHOES

This is the second year in succession to produce a large run of cohoes along the shores of this province. The total pack was a record one of 361,380 cases, which exceeded the average for the past three years by 108,209 cases. One considerable factor, of course, entering into the production of so large a pack was that the export of fresh and frozen cohoes was prohibited for the purpose of obtaining a larger quantity of canned salmon for the United Kingdom requirements.

The following shows details of the cohoe pack since 1927, arranged in three-year periods:

	Cases
1927-1929	162,010
1930-1932	128,635
1933-1935	183,112
1936-1938	200,007
1939-1941	253,171

PINKS

This is the second year in succession that the supply of pinks has been found to be unsatisfactory, the total pack being only 427,766 cases, although this total compares favourably with the average of the past two years, being an increase of 106,928 cases. It is hoped that the extra effort being made from the standpoint of conservation will produce the desired results.

A statement of the pink packs since 1928, arranged in two-year periods, is as follows:

	Cases
1928-1929	635,165
1930-1931	659,466
1932-1933	378,137
1934-1935	475,165
1936-1937	588,554
1938-1939	510,735
1940-1941	320,838

CHUMS

The total chum pack reached 920,470 cases, which exceeds the previous record of the year 1928 by 57,213 cases, and the average of the past four years by 297,393 cases. Due to the fact that there was no dry salting of chums, and that the export in a fresh or frozen state was prohibited, a considerably greater percentage of the catch was placed in cans than has ordinarily been the case. Particulars of the packs since 1922, arranged in four-year periods, are as follows:

	Cases
1922-1925	463,665
1926-1929	638,077
1930-1933	264,375
1934-1937	491,969
1938-1941	623,077

SALMON—GENERAL

The drysalting of salmon was not permitted during the year in order that a greater quantity of fish might be available for canning to meet the requirements of the United Kingdom.

The number of sockeye salmon required to fill a case of forty-eight one-pound talls, in the several fishing areas in 1941 was as follows:

Naas	11.94
Skeena	12.50
Rivers Inlet	13.40
Bella Coola	16.00
Butedale	15.03
Fraser	13.29

The statements immediately following cover the results of the year's inspection of canned salmon at the Inspection Laboratory maintained by the department at Ballantyne Pier, Vancouver:

Number of inspections made.....	3,387
Total number of cases inspected.....	2,304,599½
Total number of cases below certificate standard.....	109,391
Total number of cases available for certificates.....	2,195,208½

DETAILS OF CANNED SALMON INSPECTION ACCORDING TO SPECIES

Species	Number of Cases Inspected	Number of Cases Below Certificate Standard	Number of Cases Eligible for Certificates
Sockeye.....	458,800	10,463½	448,336½
Springs.....	51,222½	300	50,922½
Steelheads.....	3,535½	2	3,533½
Bluebacks.....	29,216½	365½	28,851
Coho.....	400,461	4,404	396,057
Pinks.....	428,100½	66,409	361,691½
Chums.....	933,263½	27,447	905,816½
Totals.....	2,304,599½	109,391	2,195,208½

PARTICULARS OF NON-CERTIFIED SALMON ACCORDING TO SPECIES

Species	Below Grade B	Grade B	Tips and Tails, etc.	Total
Sockeye.....		1,261½	9,202	10,463½
Springs.....		152½	147½	300
Steelheads.....		2		2
Bluebacks.....		33	332½	365½
Coho.....		549½	3,854½	4,404
Pinks.....	9	64,871	1,529	66,409
Chums.....	467	25,223½	1,756½	27,447
Totals.....	476	92,093	16,822	109,391

The report of the Chief Chemist, covering the year's work, will be found as Appendix No. 6.

The canned salmon and canned herring inspection fees collected, at the rate of one-half cent per case, amounted to \$14,630.57, of which \$11,136.91 was in connection with salmon and \$3,493.66 in connection with herring inspection.

EXPORT OF FRESH SALMON

The following statement gives the number, weight and value of the fresh salmon exported from the province during the year:

Variety	Number of Fish	Pounds	Value
			\$
Bluebacks.....	660	3,300	174 00
Chums.....	2,014	10,075	664 30
Coho.....	9,267	56,424	4,571 28
Pinks.....			
Sockeye.....	810	3,734	333 00
Springs.....	151,348	2,427,225	391,738 87
Steelhead.....	1,432	8,228	1,014 00
Totals.....	165,531	2,508,986	398,495 45

SALMON TAKEN BY INDIANS OF THE PROVINCE FOR PURPOSES OF THEIR OWN FOOD SUPPLIES, UNDER FREE PERMIT

The very considerable numbers of salmon taken by the Indians during the year is shown in the following statement:

—	Sockeye	Springs	Coho	Pinks	Chums	Steelhead	Total
	(fish)	(fish)	(fish)	(fish)	(fish)	(fish)	(fish)
District No. 1.....	54,511	11,562	9,420	11,665	7,920	2,275	97,353
District No. 2.....	122,590	6,428	48,643	14,468	33,107	1,512	226,748
District No. 3.....	18,375	4,070	17,900	4,935	156,820	.....	202,100

SALMON FOR UNITED KINGDOM

At the commencement of the fishing season an arrangement was completed to the end that at least two-thirds of the Canadian pack of canned salmon of the fishing season of 1941 would be made available to and be purchased by the British Government through the Canadian Government, represented by the federal Department of Fisheries. The necessary negotiations were conducted by the Department of Fisheries with the salmon industry in British Columbia, and machinery set up for the actual handling and shipping of the pack to the United Kingdom, with the assistance of two liaison officers appointed by the British Ministry of Food, who co-operated closely with the office of the Chief Supervisor at Vancouver.

The prices agreed upon for the several grades were as follows:

—	1 lb. Tall cans— 48 cans to the case	½ lb. Flat cans— 96 cans to the case	¼ lb. Flat cans— 96 cans to the case
	\$ cts.	\$ cts.	\$ cts.
Grade I (Sockeye).....	12 50	13 75	8 62½
Grade II (Coho, Redspring, Blueback and Steelhead).....	8 75	10 00	6 75
Grade III (Pink and Chum).....	5 00	6 25	4 37½

The expectations of the British Ministry of Food were considerably exceeded as the portion of the pack available to them reached 1,478,335½ cases, as will be observed from the following statement:

	Sockeye	Blueback, Coho, Steelhead, Springs	Pinks	Chums and Wh. Spr'gs	Total
Total pack.....	455,296	416,567½	427,766	949,241	2,248,870½
*Sub-Grades deducted.....	10,384½	4,482	66,404	27,556	108,826½
1941 Pack of Grade A.....	444,911½	412,085½	361,362	921,685	2,140,044
<i>Allotted as follows:</i>					
British Ministry of Food.....	353,698	256,233	215,279	653,125½	1,478,335½
Canadian allotment.....	85,382	128,040	96,345	210,926	520,693
Australian allotment.....	3,000	10,000	28,000	19,000	60,000
South African allotment.....	600	200	17,200	27,000	45,000
Other markets allotment.....		1,000	3,000	11,000	15,000
Canadian Red Cross.....		15,000			15,000
Fire losses and sundry.....	2,231½	1,612½	1,538	633½	6,015½

* Below Grade B, Grade B, Tips and Tails, etc.

It will be noted that the British authorities did not take canned Tips and Tails nor Grade B salmon.

FISH CULTURE

The last collection of sockeye salmon eggs at Anderson Lake, for the purpose of planting in Maggie Lake, was completed in the year under review, the total collection reaching 1,043,000. After this quantity was taken it was estimated by the collecting officer that an additional 15,000,000 eggs were deposited naturally at Anderson Lake. After the normal loss in hatching operations a net total of 1,030,296 eggs were deposited under favourable conditions in the gravel in the streams tributary to Maggie Lake.

HALIBUT

The total landings at British Columbia ports (Canadian and United States landings combined) amounted to 229,658 hundredweights, compared with 239,043 hundredweights in the preceding year. Undoubtedly the total was affected in some degree by the fact that a number of the more efficient Canadian halibut boats had been taken over by the national authorities. Details of the landings are shown below:

Year	Vancouver and New Westminster	Prince Rupert	Butedale- Namu Area	District No. 3	Totals
	cwts.	cwts.	cwts.	cwts.	cwts.
1930.....	11,387	293,617	978	2,814	308,796
1931.....	8,498	167,757	3,627	2,123	182,005
1932.....	11,883	148,615	6,677	1,672	168,847
1933.....	13,436	144,065	10,431	2,440	170,372
1934.....	16,113	150,476	13,297	2,716	182,602
1935.....	22,351	129,586	15,713	3,493	171,143
1936.....	20,777	131,830	11,522	3,992	168,121
1937.....	23,334	147,638	12,676	3,777	187,425
1938.....	28,155	141,691	17,776	5,866	193,488
1939.....	30,225	173,857	18,651	4,455	227,188
1940.....	26,010	185,921	23,157	3,955	239,043
1941.....	22,057	166,513	30,946	10,142	229,658

FISH LIVERS

The value of the production of all varieties of fish livers in the province during the year, to the fishermen, was \$878,456. The marketed value of the livers amounted to \$1,247,959.

The development of the fish liver business has been all within the past ten years and has resulted in a very welcome addition to the income of the fishermen. The outstanding features of the year under review are the great demand for grayfish livers, which show a marketed value of \$560,683, and the new business in soupfin shark livers, with a total marketed value of \$68,122.

Grayfish liver prices in 1941 averaged 9 cents per pound, with a "high" of 23 cents, and the soupfin shark livers brought an average of \$2.22 per pound and the high was \$4.95. Halibut livers averaged 45 cents per pound, ling cod 61 cents per pound, black cod 58 cents per pound, and red cod 45 cents per pound.

OYSTERS

There was a very large increase in the number of barrels of oysters marketed fresh last year, the total being 27,802 barrels, as compared with 2,813 the previous year. This is accounted for by the greatly increased demand for British Columbia oysters in the supplying of markets which in past years had received their shipments from the United States. Another factor is the practical discontinuance of the importation of Eastern oysters from the Atlantic coast for planting in British Columbia waters. It has been found that the cost of these operations, particularly in the way of freight charges, does not now justify this business, especially when there are ample supplies of the Pacific oysters which appear to satisfy markets previously concerned with the Eastern oysters only. The Pacific oyster is a larger variety and fewer are required to fill a barrel. A further factor is the recent greatly increased operations by one of the larger companies. The production of canned oysters in 1941 was 3,475 cases. Figures showing the quantities of oysters marketed fresh and canned during the period 1930-1940 may be found in the department's annual report for the year 1940-1941.

HERRING

The British Government, through the Ministry of Food, arranged with the Dominion Government whereby they would secure, providing the necessary supplies of herring were available, 35,000 long tons net to be canned during the winter herring season of 1941-1942. This quantity would be the equivalent of approximately 1,600,000 cases of canned fish. It was arranged that 26,500 long tons should be packed in No. 1 Oval cans, 3,500 long tons in Half Ovals, and 5,000 long tons in No. 1 Talls.

As the season progressed the operators felt that they would be able to obtain a larger quantity than arranged, if they were permitted to pack No. 1 Talls. As a result, the British Ministry of Food agreed to take a further 5,000 tons if the industry could procure the necessary tomato paste or puree.

The prices to be paid were:

One-pound Oval cans, 48 cans to the case.....	\$3.75
Half-pound Oval cans, 48 cans to the case.....	3.10
One-pound Tall cans, 48 cans to the case.....	3.30

The whole pack was to be processed with tomato puree or paste supplied by the British Ministry of Food.

At the end of the year a total of 1,013,329 cases had been packed, as shown in the detailed statement given below:

	District 1	District 2	District 3	Total	Green Tons
Catch.....cwts.	1,368	474,631	1,212,516	1,688,515	84,425.75
Production—					
Fresh.....cwts.	3,770	396	2,932	7,098	354.9
Canned.....cases	735,987	92,580	184,762	1,013,329	35,555.4
Bloatered.....cwts.	90	2		92	9.2
Kippered.....cwts.	3,099	9	490	3,598	359.8
Used as bait.....bbls.	6,165	19,216	22,392	47,773	4,777.3
Brine cured.....bbls.			985	985	147.7
Pickled.....bbls.	1,470			1,470	220.5
Herring Meal.....tons	1,637	2,866.5	3,254	8,757.5	43,000.95
Herring Oil.....l. gals.	194,230	148,761	241,166	584,157	
					84,425.75

As in the case of canned salmon, the necessary machinery was set up in Vancouver by which, with the assistance of the liaison officers appointed by the British Ministry of Food, all shipping arrangements were looked after in Vancouver.

No drysalt herring operations were conducted during the year, owing to the necessity for placing as large a portion of the catch as possible in cans, for the purposes of the United Kingdom, and also due, in part, to chaotic conditions in the Pacific Ocean which made shipping facilities unavailable to move drysalt herring to Oriental markets. Figures showing drysalt herring production in the period 1918-1940 may be found in the annual departmental report for 1940-41.

HERRING—REGULATIONS

For the past five years a quota system for herring fishing has been enforced in the area on the west coast of Vancouver Island, and on the lower east coast as well. This system was adopted after consultation with scientists of the Fisheries Research Board, who were desirous, in connection with their investigation of the herring fisheries of the province, of using the quota arrangement for a period of five years. This system has now been renewed for a further period of five years, and has been extended to cover the whole coast of British Columbia.

As the requirements of the British Ministry of Food call for the inspection of canned herring which is being packed in British Columbia on their account, it was necessary to extend the operations of the Inspection Laboratory maintained by the Department in Vancouver to cover canned herring. As a result certificates are available, as in the case of canned salmon, for all herring that passes inspection. Also, provision was made, as in the case of canned salmon, for Grade B classification but certificates are not available for Grade B herring. No Grade B fish, however, was accepted by the United Kingdom.

PILCHARDS

The pack of canned pilchards amounted to 58,038 cases, as shown in Statement No. 8. This year pilchards were found quite close to British Columbia shores, off the west coast of Vancouver Island, which permitted economical operation.

TUNA

Tuna were reported as fairly plentiful off the west coast of Vancouver Island at various times during the summer and fall months. There was very little fishing, however, owing to the demand for the suitable variety of fishing boat

in other branches of the industry, particularly in pilchard and salmon fishing. The total tuna landings amounted to only 760 hundredweights for which the fishermen obtained the price of \$9 per hundredweight.

CLEARING OF OBSTRUCTIONS IN SALMON STREAMS

During the year a total of \$2,045.18 was expended in the clearing of obstructions in the following thirteen salmon streams: Alpha Bay Creek, \$42.30; Atnarko River, \$148.50; Bridge River Canyon, \$104.05; Brunette River, \$2.50; Captain's Cove, \$42.35; Lewis Lake, \$17.50; Lowe Inlet, \$1,070.28; Port Stephens Creek, \$36.80; San Josef River, \$10; Sewell Inlet, \$33.65; Silicia Creek, \$436.05; Stamp Falls Fishway, \$51.50; Tinkey River, \$49.70. Total, \$2,045.18.

VIOLATIONS

Immediately following will be found a summary covering results of 253 prosecutions carried out during the year for violations of the fishery regulations, showing a total of \$16,795.29 from confiscations and fines:

	District No. 1	District No. 2	District No. 3	Totals
Number of prosecutions.....	63	85	105	253
Fines.....	\$ 1,330 00	\$ 3,980 00	\$ 2,966 50	\$ 8,276 50
Sales.....	576 79	6,230 23	1,711 77	8,518 79
	1,906 79	10,210 23	4,678 27	16,795 29

PATROL SERVICE

The number of boats utilized for the purpose of protection of the fisheries during the year was 104, of which 21 were departmentally owned. Difficulty was experienced in obtaining the required number of qualified patrolmen and engineers because of the manpower conditions resulting from the war.

PRODUCTION OF FISH OIL AND MEAL

It will be observed from Statement No. 9 that there has been a marked increase in the production of meal and oil from pilchards. This was due, of course, to the unexpectedly good run of these fish off the west coast of Vancouver Island. In the case of herring, there was a considerable reduction, a natural condition in view of the effort required of the industry to place all herring possible in cans for the purposes of the United Kingdom.

RESULTS OF WAR CONDITIONS

Immediately on the declaration of war between Canada and Japan, the Canadian authorities placed under detention all boats engaged in the fishing industry owned or operated by Japanese nationals or by other persons of Japanese racial origin. The total number seized was approximately 1,200. They included seiners, gillnetters, trollers, trawlers and packers. Steps to bring as many as possible of these boats back into fisheries operations under non-Japanese ownership or control are being planned.

The fishing industry was affected in one important measure by the need, for national defence purposes, of a substantial number of fishing boats. Some of the most efficient seiners and packers were taken over by the defence authorities and fisheries operations were correspondingly affected.

The export of fresh and frozen salmon in British Columbia, with the exception of troll-caught springs, was prohibited in order that larger quantities might be made available of the several varieties for canning purposes.

In view of the uncertainty of securing a sufficient quantity of pinks and chums for canning to meet the British requirements, the freezing of these varieties of salmon was prohibited from August 15th to October 1st, 1941.

EXPORT PERMITS

At the request of the Minister of Trade and Commerce the facilities at the Vancouver Fisheries office were made available for the purpose of issuing export permits in the case of fish products. The total number issued during the year was 797. In view of the fact that these forms are issued in sextuplicate, the added routine work was considerable.

STAFF

Adam Mackie, Supervisor of Fisheries at the Vancouver office, after twenty-seven years of service left on leave on June 27th, pending retirement from the service as from December 27th, 1941. John McIlugh, Senior Resident Engineer, Vancouver office, after twenty-seven years of service left on leave, pending retirement from the service as from March 30th, 1942. W. P. Forsythe, Inspector of Fisheries in the Kamloops area, changed places with Inspector W. M. Ferrier of the Prince George area. E. H. Thomas, Stenographer, Grade 1, in the office of the Supervisor for District No. 1, at New Westminster, was granted leave of absence on joining the Royal Canadian Air Force. Personnel employed at the "peak" period of the year totalled 303.

SPORT FISHING

Sport fishing was again excellent in the tidal portions of the numerous streams along the coast, particularly in the vicinity of Cowichan, Chemainus, Nanaimo, Qualicum, Courtenay, and the Campbell and Somass rivers, and the Horseshoe Bay and Howe Sound areas along the mainland. Many tourists enjoyed the sport, particularly the spring salmon fishing in the Alberni district and along the east coast of Vancouver Island. The local officer in the Comox district refers to the run of springs in that area as the best and most sustained within his memory. The plentiful supply of coho provided splendid sport for fly fishermen, as well as for those who use the spoon.

STATEMENT No. 1—ANNUAL CANNED SALMON PRODUCTION IN BRITISH COLUMBIA—1933-1941

Year	Num-ber of can-neries oper-ated	Number of salmon licences issued					Packed canned									Totals
		G.N.	Troll	P.S.	D.S.	T.N.	Sockeye	Red Spring	Pink Spring	White Spring	Blue-back	Steel-head	Coho	Pink	Chum	
1933.....	49	6,113	2,880	238	31	8	258,107	12,464	1,849	5,953	21,763	1,459	137,289	532,558	293,630	1,265,072
1934.....	49	6,826	3,099	296	9	8	377,882	15,281	1,644	12,859	29,556	1,282	195,874	435,364	513,184	1,582,926
1935.....	43	6,216	3,107	293	9	8	350,444	10,187	3,114	8,619	15,319	596	216,173	514,966	409,604	1,529,022
1936.....	46	6,620	3,511	287	9	7	415,024	16,493	2,527	10,834	33,718	1,068	212,343	591,532	597,487	1,881,026
1937.....	37	6,095	3,162	291	9	5	325,774	10,963	1,788	3,420	19,236	844	113,972	585,576	447,602	1,509,175
1938.....	38	7,125	3,453	300	9	5	447,453	10,276	2,322	2,933	27,417	1,035	273,706	400,876	541,812	1,707,830
1939.....	35	6,502	3,947	339	9	5	269,888	10,302	2,848	2,947	48,209	797	196,887	620,595	386,584	1,539,057
1940.....	38	6,392	3,222	350	9	5	366,403	11,868	2,856	3,017	23,277	1,205	201,467	213,911	643,443	1,467,227
*1941.....	36	5,502	3,080	333	9	5	455,297	17,794	3,911	28,771	30,027	3,454	361,380	427,766	920,470	2,248,870

* Does not include Salmon canned in 1941 from cold storage stocks caught in 1940, particulars of which are given hereunder:—

.....	8	31	1,079	39,104	6,339	46,561
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* Does not include Salmon canned in 1941 from cold storage stocks caught in 1940, particulars of which are given hereunder:—

.....	8	31	1,079	39,104	6,339	46,561
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NOTE.—Licences issued include transfers from one district to another, except in the case of purse-seines.

DEPARTMENT OF FISHERIES

STATEMENT No. 2—PACK OF CANNED SALMON ON THE NAAS RIVER—1933-1941

Year	Num-ber of can-neries oper-ated	Number of salmon licences issued					Packed canned									
		G.N.	Troll.	P.S.	D.S.	T.N.	Sockeye	Red Spring	Pink Spring	White Spring	Blue-back	Steel-head	Coho	Pink	Chum	Totals
*1933	3	297					10,173	1,014	227	214		114	19,016	57,406	2,778	90,942
†1933							9,757	885	227	184		49	3,251	44,306	1,775	60,434
*1934	3	335					36,242	533	126	145		311	26,698	37,698	5,558	107,311
†1934							28,701	383	126	145		311	9,935	32,965	2,648	75,214
*1935	3	310					12,712	94	298	168		143	21,810	25,508	17,481	78,214
†1935							12,245	86	298	168		143	5,125	21,443	12,681	52,189
*1936	3	349					28,562	1,622	229	316		496	11,842	72,022	20,196	135,285
†1936							24,137	520	188	237		496	8,439	60,582	16,504	111,103
*1937	2	321					17,590	773	245	232		46	12,336	7,876	10,530	49,628
†1937							11,630	773	245	232		46	316	5,888	6,009	24,939
*1938	2	309					21,746	458	189	125		188	20,485	61,660	15,135	119,986
†1938							14,795	13	165	125		188	3,986	29,843	6,804	55,919
*1939	2	289					24,425	170	389	149		15	3,209	29,819	2,615	60,791
†1939							18,834	17	297	137		15	1,667	19,479	1,784	42,230
*1940	2	254					13,810	1,258	181	275		120	11,447	29,893	5,461	62,445
†1940							8,056	118	95	99		117	1,975	12,151	2,149	24,750
*1941	2	281					24,876	133	187	207		377	14,430	23,274	5,971	69,455
†1941							14,221	16	125	147		147	6,711	12,570	1,757	35,694

*Pack of fish caught at Naas river regardless where canned.

† Pack of Naas river regardless where caught.

NOTE.—Licences issued, include transfers from other districts.

STATEMENT No. 3—PACK OF CANNED SALMON ON THE SKEENA RIVER—1933-1941

Year	Num-ber of can-eries oper-ated	Number of salmon licences issued					Packed canned								Totals	
		G.N.	Troll	P.S.	D.S.	T.N.	Sockeye	Red Spring	Pink Spring	White Spring	Blue-back	Steel-head	Coho	Pink	Chum	cases
†1933	10	1,218					30,506	2,626	444	227		267	39,896	95,783	15,714	185,463
†1933							27,693	6,805	444	828		201	21,366	79,932	10,970	143,239
†1934	9	1,164					70,664	6,844	592	860		114	54,470	125,163	24,388	283,085
†1934							54,558	6,809	592	860		131	21,298	27,628	6,242	118,118
†1935	9	1,053					64,140	3,443	429	188		12	45,512	99,412	31,807	244,943
†1935							52,879	3,422	429	188		14	23,498	81,868	8,192	170,420
†1936	8	970					97,823	4,883	455	435		33	55,198	178,299	36,892	374,018
†1936							81,960	3,781	414	356		33	32,142	92,997	15,343	227,026
†1937	7	850					55,811	3,788	382	315		21	34,502	72,455	37,431	204,705
†1937							41,023	3,704	382	315		21	14,573	57,623	10,027	127,668
†1938	6	1,049					73,508	3,361	1,165	259		42	100,658	146,676	34,785	360,454
†1938							46,988	2,916	1,141	259		42	38,542	69,299	14,668	173,855
†1939	6	844					96,358	3,277	1,488	348		55	48,973	127,521	15,666	293,686
†1939							68,388	3,124	1,396	236		55	27,115	91,559	6,560	198,333
†1940	7	926					133,854	5,884	1,113	571		133	62,516	91,612	62,114	359,797
†1940							116,505	4,708	1,017	396		130	19,196	46,687	4,684	193,323
†1941	7	981					110,544	4,695	703	448		2,261	126,557	73,896	54,357	373,461
†1941							81,183	3,929	641	368		1,890	45,891	51,389	12,138	197,429

† Pack of fish caught at Skeena river regardless where canned.
NOTE.—Licences issued include transfers from other districts.

‡ Pack at Skeena river regardless where caught.

STATEMENT No. 4—PACK OF CANNED SALMON FROM FISH CAUGHT AT RIVERS INLET AND SMITHS INLET—1933-1941

Year	Num-ber of can-neries oper-ated	Number of salmon licences issued				Packed canned										Totals	
		G.N.	Troll	P.S.	D.S.	T.N.	Sockeye	Red Spring	Pink Spring	White Spring	Blue-back	Steel-head	Coho	Pink	Chum		
							cases	cases	cases	cases	cases	cases	cases	cases	cases	cases	cases
1933.....	11	1,962					119,548	606	108	243		153	9,078	11,658	8,932	150,226	
1934.....							114,045	464	108	241		169	8,574	25,054	9,518	158,103	
1935.....	11	2,318					89,575	532	82	129		131	11,862	2,928	14,375	119,604	
1936.....							82,328	390	82	128		122	8,793	9,769	16,444	118,556	
1937.....	8	2,023					166,086	138	352	155		63	9,576	8,966	19,563	205,499	
1938.....							129,531	94	306	146		49	917	6,046	7,128	144,216	
1939.....	8	2,210					59,138	317	132	162		60	7,432	6,497	13,158	86,896	
1940.....							42,803	315	131	148		54	7,683	17,254	10,921	79,809	
1941.....	6	1,875					108,170	377	396	235		75	6,374	7,973	18,894	142,494	
1942.....							91,399	355	452	233		76	5,381	18,873	21,931	138,631	
1943.....	6	2,261					122,093	744	181	359		169	17,527	10,827	15,832	167,732	
1944.....							86,490	716	156	351		99	14,284	12,447	17,102	131,625	
1945.....	4	1,817					71,068	412	206	329		133	16,125	14,580	7,437	110,290	
1946.....							36,937	285	32	306		82	6,902	19,256	4,903	68,103	
1947.....	4	1,896					89,142	810	238	320	21	91	12,744	4,085	15,167	122,618	
1948.....							48,535	494	101	294		40	7,492	4,315	2,369	63,600	
1949.....	2	1,355					115,342	1,006	148	667		179	25,165	5,558	23,203	171,263	
1950.....							50,238	624	78	593		104	16,067	6,193	6,236	80,133	

NOTE.—Figures shown in roman are packs from fish caught at Rivers Inlet or Smiths Inlet. Figures shown in italics are actual packs irrespective of where fish taken and not including fish shipped out for canning in other districts. Licences issued include transfers from other districts.

STATEMENT No. 5—PACK OF CANNED SALMON IN THE FRASER RIVER DISTRICT—1933-1941

Year	Num-ber of can-neries oper-ated	Number of salmon licences issued					Packed canned								Totals
		Number of salmon licences issued				Sockeye	Red Spring	Pink Spring	White Spring	Blue-back	Steel-head	Coho	Pink	Chum	
		G.N.	Troll	P.S.	D.S.											T.N.
1933	10	1,685	110	64	.....	53,481	5,701	426	4,554	13,299	.....	25,715	143,058	77,330	323,564
1934*	11	1,803	98	105	.....	145,579	5,495	263	11,072	22,566	.....	30,751	35,847	219,331	470,904
1934†	10	1,663	124	108	.....	133,159	4,713	173	10,760	1,607	.....	10,991	342	103,081	264,826
1935*	10	1,663	124	108	.....	76,415	5,181	326	6,783	7,701	.....	63,933	182,528	72,353	415,220
1935†	11	1,784	118	.....	.....	57,212	4,205	212	4,984	350	.....	24,600	111,328	8,227	211,118
1936*	11	1,784	118	.....	.....	165,651	7,123	461	8,426	20,647	.....	51,243	23,842	188,538	465,942
1936†	10	2,082	190	58	.....	164,408	6,680	310	8,142	.....	.....	22,572	2	30,663	232,777
1937*	10	2,082	190	58	.....	103,137	3,877	226	1,940	19,065	.....	25,618	252,416	119,254	525,548
1937†	10	2,161	210	.....	.....	66,583	3,622	84	1,738	1,354	.....	11,242	87,897	20,934	193,469
1938*	2,319	190	112	.....	.....	217,882	4,592	413	1,532	21,923	.....	54,314	29,862	181,444	512,034
1938†	10	2,161	210	.....	.....	169,430	3,754	32	508	.....	.....	28,687	63	49,835	252,322
1939*	10	2,161	210	.....	.....	73,216	5,092	475	1,511	32,833	.....	48,120	204,681	143,020	509,034
1939†	10	2,237	212	.....	.....	43,294	4,466	448	1,094	8,428	.....	17,144	108,608	42,480	225,986
1940*	10	2,237	212	.....	.....	121,080	4,036	311	1,042	13,627	.....	47,397	13,243	178,860	379,774
1940†	11	2,025	195	.....	.....	86,215	3,411	279	770	.....	.....	12,369	12	40,056	143,256
1941†	11	2,025	195	.....	.....	149,716	7,132	1,285	25,507	.....	.....	28,260	102,799	90,274	405,221
1941*	11	2,025	195	.....	.....	196,871	8,290	1,425	26,396	18,466	.....	91,571	179,071	360,623	883,028

* Represents actual pack, regardless where caught.

† Represents pack of Fraser fish, regardless where canned.

NOTE.—Licences issued include transfers from other districts. 1936† pack of Sockeye on Fraser, 164,408 cases, does not include 16,611 cases Sockeye caught on Fraser and exported and canned in Puget Sound canneries. 1940† pack of Sockeye on Fraser, 86,215 cases, does not include 4,536 cases Sockeye caught on Fraser and exported and canned in Puget Sound canneries. 1941: The above figures do not include packs of salmon canned in 1941 from Cold Storage stocks caught in 1940, particulars of which are given hereunder:

1941 pack of 1940 catch..				Totals		
Red Spring	Pink Spring	White Spring	Coho	Chums		
8	31	1,079	39,104	6,339	46,561	

DEPARTMENT OF FISHERIES

STATEMENT No. 6—PACK OF CANNED SALMON OF PUGET SOUND, U.S.A., FROM
1933 to 1941

Year	Number of canneries operated	Spring	Sockeye	Coho	Chum	Pink	Steelhead	Total
		cases	cases	cases	cases	cases	cases	cases
1933.....	19	20,869	125,738	44,568	37,039	543,340	222	771,776
1934.....	20	14,398	352,579	69,254	73,337	3,606		513,174
1935.....	14	9,737	54,677	71,985	15,604	377,445		529,448
1936.....	9	6,328	59,505	29,119½	80,831½	1,345		177,201
1937.....	14	8,968	60,259	32,559	17,417	327,833		447,036
1938.....	13	2,787½	134,651	9,820½	7,852½	193		155,304½
1939.....	14	2,439	43,511	54,773	14,505	275,485		390,713
1940.....	9	1,991	63,890	30,478½	21,618	2,732		120,718½
1941.....	9	4,706	110,605	45,968	21,170	153,686		336,135

STATEMENT No. 7.—STATEMENT OF HALIBUT LANDINGS—BRITISH COLUMBIA—
1930-41*

(Includes landings in United States bottoms)

	Cwt.
1930	254,796
1931	182,005
1932	168,847
1933	170,372
1934	182,602
1935	171,143
1936	168,121
1937	187,425
1938	193,488
1939	227,188
1940	239,043
1941	229,658

* Figures for earlier years may be found in the annual report for 1940-41.

STATEMENT No. 8—CANNED PILCHARD PACK—BRITISH COLUMBIA—1933-1941

1933	2,946	1938	69,374
1934	35,437	1939	7,300
1935	27,184	1940	59,166
1936	35,007	1941	58,038
1937	40,975		

NOTE.—For earlier figures see departmental report for 1940-41.

STATEMENT No. 9—PRODUCTION FISH OIL AND MEAL—BRITISH COLUMBIA,
1933-1941

Year	From Pilchards		From Herring		From Whales			From Other Sources*	
	Meal and fertilizer	Oil	Meal	Oil	Whale- bone and meal	Fertilizer	Oil	Meal and fertilizer	Oil
	tons	gals.	tons	gals.	tons	tons	gals.	tons	gals.
1933....	1,108	275,879	4,078	316,213	249	223	509,310	1,596	187,560
1934....	7,626	1,635,123	2,570	104,710	340	631	813,724	2,458	337,025
1935....	8,681	1,649,392	5,262	306,767	211	354	426,772	2,147	247,437
1936....	8,715	1,217,097	10,985	782,499	332	687	763,740	3,148	335,969
1937....	8,483	1,707,276	14,427	1,283,658	268	527	662,355	2,720	294,546
1938....	8,891	2,195,850	9,624	929,158	273	490	543,378	2,491	228,157
1939....	906	178,305	16,462	1,366,607				3,004	283,504
1940....	4,853	877,556	24,264	1,700,819	181	434	361,620	3,526	285,314
1941....	10,473.2	1,789,708	8,757.5	584,157	271	577	566,505	5,081.6	390,939

* Salmon and halibut offal, gray fish, and anchovies.

STATEMENT No. 10—NUMBER OF WHALES LANDED—BRITISH COLUMBIA, 1933-1941.

Species	1933	1934	1935	1936	1937	1938	1940	1941
Sperm.....	190	265	175	311	265	252	126	233
Sulphur.....	1		6	3	1	4	2	1
Fin.....	17	71	20	48	44	50	90	67
Hump.....		14	1	14	7	4	2	27
Sei.....	1			2				
Bottlenose.....								
Totals.....	209	350	202	378	317	310	220	328

* No whaling plants operated in 1939.

STATEMENT No. 11—STATEMENT OF LICENCES ISSUED FOR SALMON CANNERIES AND SALMON FISHING GEAR (NOT INCLUDING LICENCES TO CAPTAINS AND ASSISTANTS ON SALMON SEINE-BOATS OR ASSISTANTS ON SALMON GILL-NET BOATS.) BRITISH COLUMBIA—1933-1941

Kind of Licence	1933	1934	1935	1936	1937	1938	1939	1940	1941
<i>District No. 1—</i>									
Salmon cannery.....	10	11	10	11	10	10	10	10	11
Salmon trolling.....	110	98	124	118	190	190	210	212	195
Salmon gill-net.....	1,685	1,803	1,663	1,784	2,082	2,319	2,161	2,237	2,025
<i>District No. 2—</i>									
Salmon cannery.....	29	31	26	27	20	22	18	20	17
Salmon purse-seine.....	55	109	102	99	82	100	98	131	95
Salmon drag-seine.....	11	9	9	9	9	9	9	9	9
Salmon trolling.....	882	937	930	964	916	958	863	737	791
Salmon gill-net—									
Lowe Inlet.....	59	67	58	74	76	80	135	106	61
Naas River.....	297	335	310	349	321	309	289	254	281
Skeena River.....	1,218	1,164	1,053	970	856	1,049	844	926	981
Rivers Inlet.....	1,603	1,699	1,699	1,802	1,490	1,796	1,550	1,518	1,070
Smiths Inlet.....	359	39	324	408	385	465	267	378	285
Bella Coola.....	228	285	268	265	261	242	216	192	161
Kimsquit and Butedale	43	48	41	57	18	80	102	148	78
Namu.....	107	141	129	146	137	159	148	134	93
Queen Charlotte Islands	2	19		24	4	53	9	14	8
Total, salmon gill-net, District No. 2.....	3,916	4,377	3,882	4,095	3,548	4,233	3,560	3,670	3,018
<i>District No. 3—</i>									
Salmon cannery.....	10	7	7	8	7	6	7	8	8
Salmon trap-net.....	8	8	8	7	5	5	5	5	5
Salmon purse-seine.....	183	187	191	188	209	200	241	219	238
Salmon drag-seine.....	20								
Salmon trolling.....	1,888	2,064	2,053	2,429	2,056	2,305	2,874	2,273	2,094
Salmon gill-net.....	512	646	673	741	466	573	781	485	459
<i>Whole Province—</i>									
Salmon cannery.....	49	49	43	46	37	38	35	38	36
Salmon trap-net.....	8	8	8	7	5	5	5	5	5
Salmon purse-seine.....	236	296	293	287	291	300	339	350	333
Salmon drag-seine.....	31	9	9	9	9	9	9	9	9
Salmon trolling.....	2,880	3,099	3,107	3,511	3,162	3,453	3,947	3,222	3,080
Salmon gill-net.....	6,113	6,826	6,218	6,620	6,096	7,125	6,502	6,392	5,502

NOTE.—Salmon cannery licences shown above were issued by the Provincial Fisheries Department.

STATEMENT No. 12—PACK OF SOCKEYE SALMON FROM RUNS TO FRASER RIVER*, 1933-1941

Year	Fraser River Pack	Canadian Traps in Juan de Fuca Straits	Puget Sound Pack	Total Cases
1933.....	43,745	8,721	125,738	178,204
1934.....	133,159	6,117	352,579	491,855
1935.....	57,212	5,610	54,677	117,499
1936.....	164,408	3,837	59,505	227,750
1937.....	66,583	6,152	60,259	132,994
1938.....	169,430	3,784	139,173	312,387
1939.....	43,249	4,290	43,511	91,050
1940.....	86,215	2,247	63,890	152,352
1941.....	149,715½	9,563	110,605	269,883½

Figures represent pack of Fraser River sockeye, regardless where canned.

DEPARTMENT OF FISHERIES

STATEMENT No. 13—STATEMENT OF FISHERY LICENCES ISSUED—BRITISH COLUMBIA—SEASON 1941-42

Variety of Licence	Issued					Transfers			Operating							
	White	Ind.	Others	Jap RS.	Can- celled	Total	White	Ind.	Jap RS.	Total	White	Ind.	Others	Jap RS.	Can- celled	Total
Salmon Trap-net.....	5					5										5
Salmon Drag-seine.....		9				9										9
Salmon Purse-seine.....	282	50				333										333
Salmon Gill-net.....	2,458	1,249	913	34	67	4,721	547	220	14	781	3,005	1,469	913	48	67	5,502
Salmon Trolling.....	2,394	480	155	2	17	3,048	32	1		33	2,426	481	155	2	17	3,081
Asst. Salmon Gill-net.....	132	306	244		69	751					132	306	244		69	751
Capt. Salmon Seine.....	120	116			4	240					120	116			4	240
Asst. Salmon Seine.....	1,130	812			1	1,943					1,130	812			1	1,943
Cod.....	239	39	153		20	451					239	39	153		20	451
Crab.....	70	9				79					70	9				79
Grayfish.....	356	121	419		1	897	1			1	357	121	419		1	898
Miscellaneous.....	65	10	33	1	3	112					65	10	33	1	3	112
Small Dragger.....	40					50					40					50
Smelt.....	23		18		1	42					23		18		1	42
Pilchard Purse-seine.....	31					31					31					31
Capt. Pilchard Seine.....	23	4				27					23	4				27
Asst. Pilchard Seine.....	170	7				177					170	7				177
Herring Pound.....	10					10					10					10
Herring Purse-seine.....	57		1			58					57		1			58
Herring Gill-net.....	19		8			27					19		8			27
Capt. Herring Seine.....	35	4	6			45					35	4	6			45
Asst. Herring Seine.....	338	89	92			519					338	89	92			519
Capt. Hal. boat for bait.....	9		1			10					9		1			10
Capt. Tuna boat.....	5					5					5					5
Asst. on Tuna boat.....	6					6					6					6
Whaling permits.....	6					6					6					6
	8,023	3,305	2,053	37	184	13,602	580	221	14	815	8,603	3,526	2,053	51	184	14,417

Indian permits, 1,450. Cancelled, 6. Destroyed, 17, through inadvertence.

LICENCES ISSUED BY PROVINCIAL FISHERIES DEPARTMENT—
BRITISH COLUMBIA 1941 SEASON

Salmon canneries	36
Herring canneries	21
Pilchard canneries	5
Tierced salmon plants	4
Fish cold storage plants	9
Dogfish and fish-offal reduction plants	12
Shellfish canneries	4
Whale reduction plants	2
Pilchard reduction plants	9
Herring reduction plants	14
Pickled herring plants	1
Fish buyers' licences	288
Non-tidal fishing licences	106
Sturgeon fishing licences	2

STATEMENT No. 14—STATEMENT OF NUMBERS OF DIFFERENT SPECIES OF SALMON
AND METHOD OF CAPTURE REPORTED BY OPERATORS OF SALMON PURSE-
SEINES, DRAG-SEINES AND TRAP-NETS AND BY SALMON CANNING, CURING
AND COLD STORAGE ESTABLISHMENTS, OF GILL-NET AND TROLL CAUGHT
FISH, BRITISH COLUMBIA—SEASON 1941.

Method of Capture	Sockeye	Springs	Bluebacks	Steel-head	Cohoes	Pinks	Chums	Total
Troll.....	4,942	311,572	458,272	.....	1,200,176	57,549	25,661	2,058,172
Gill-net.....	4,503,538	367,445	.....	65,604	685,769	3,133,940	1,132,927	9,889,223
Purse-seine.....	688,707	15,332	3,826	1,290	554,451	2,901,275	5,167,827	9,332,708
Drag-seine.....	21,678	.....	.....	.....	7,111	6,104	7,269	42,162
Trap-net.....	129,812	18,938	.....	1,264	42,742	55,503	2,360	250,619
Totals.....	5,348,677	713,287	462,098	68,158	2,490,249	6,154,371	6,336,044	21,572,884

STATEMENT No. 15—STATEMENT OF NUMBER OF SALMON CAUGHT BY PURSE-
SEINES, SHOWN BY SEINING AREAS, BRITISH COLUMBIA—SEASON 1941

Area	Sockeye	Spring	Blue-back	Steel-head	Coho	Pink	Chum	Total
1.....	.....	.....	.....	.....	1,089	9	36,554	37,652
2.....	1	.....	.....	.....	17,782	24,925	578,826	621,534
3.....	59,540	418	.....	64	12,420	169,696	39,473	281,611
4.....	352	2	.....	1	768	10,127	1,864	13,114
5.....	29,657	4	6	2	27,790	51,673	21,354	130,486
6.....	18,687	303	.....	117	29,270	172,160	192,118	412,655
7.....	3,288	390	.....	34	18,710	200,360	255,869	478,651
8.....	40	5	.....	31	8,152	30,389	15,352	53,969
9.....	1,483	71	.....	61	8,582	51,747	49,712	111,656
10.....	3,369	30	.....	.....	10,242	6,375	69,515	89,531
11.....	22	.....	.....	.....	5,166	787	25,097	31,072
12.....	318,119	8,313	31	525	222,312	1,239,905	943,584	2,732,789
13.....	215,885	3,666	3,789	443	90,370	891,410	1,216,412	2,421,975
14.....	350	57	.....	5	2,906	3,209	327,450	333,977
15.....	332	3	.....	.....	107	8,321	48,510	57,273
16.....	14	1	.....	.....	535	18,933	28,906	48,389
17.....	6,000	15	.....	.....	29,647	10,034	33,270	78,966
18.....	.....	.....	.....	.....	743	.....	44,723	45,466
19.....	3	300	.....	.....	1,447	.....	75,775	77,525
20.....	6,136	276	.....	5	2,888	2	.....	9,307
21.....	3,623	70	.....	.....	6,715	.....	3,904	14,312
22.....	22	10	.....	.....	10,348	.....	322,200	332,580
23.....	7	1,392	.....	1	23,454	11,212	345,942	382,008
24.....	21,777	4	.....	.....	4,481	1	89,844	116,107
25.....	.....	.....	.....	.....	9,606	.....	354,551	364,157
26.....	.....	.....	.....	.....	5,403	.....	25,304	30,707
27.....	.....	2	.....	1	3,518	.....	21,718	25,239
Totals.....	688,707	15,332	3,826	1,290	554,451	2,901,275	5,167,827	9,332,708

DEPARTMENT OF FISHERIES

STATEMENT No. 16—STATEMENT SHOWING PACKS OF CANNED SALMON, 1932-1941
WITH QUANTITIES GRADED SECOND QUALITY AND PERCENTAGES

—	Sockeye	Springs	Steel- head	Blue- back	Coho	Pinks	Chum	Total
1932 Pack, cases.....	284,355	76,060	1,168	28,505	160,466	223,716	306,761	1,081,031
Grade B, cases.....	3,355	1,234	.....	164	333	119	3,083	8,288
Per cent.....	1.179	1.622	.....	.575	.207	.053	1.005	.766
1933 Pack, cases.....	258,107	20,266	1,459	21,763	137,289	532,558	293,630	1,265,072
Grade B, cases.....	494	.....	.....	10	873	15,149	887	17,413
Per cent.....	.191	.....	.....	.045	.635	2.844	.302	1.376
1934 Pack, cases.....	377,882	29,784	1,282	29,556	195,874	435,364	513,184	1,582,926
Grade B, cases.....	21,620	139	5	.....	962	4,085	1,127	27,938
Per cent.....	5.721	.466	.390	.....	.491	.938	.219	1.764
1935 Pack cases.....	350,444	21,920	596	15,319	216,173	514,966	409,604	1,529,022
Grade B, cases.....	3,435	659	.....	.....	3,840	20,525	5,601	34,063
Per cent.....	.980	3.006	.....	.....	1.776	3.986	1.367	2.227
1936 Pack, cases.....	415,024	29,854	1,068	33,718	212,343	591,532	597,487	1,881,026
Grade B, cases.....	13,725	.....	.....	.....	483	29	5,265	19,502
Per cent.....	3.307	.....	.....	.....	.227	.005	.881	1.036
1937 Pack, cases.....	325,774	16,171	844	19,236	113,972	585,576	447,602	1,509,175
Grade B, cases.....	65	.....	.....	.....	68	27,282	3,212	30,627
Per cent.....	.019	.....	.....	.....	.059	4.659	.717	2.029
1938 Pack, cases.....	447,453	15,531	1,035	27,417	273,906	400,876	541,812	1,707,830
Grade B, cases.....	16,361	.....	.....	56½	1,111	1,413	1,583	20,524½
Per cent.....	3.656	.....	.....	.206	.405	.352	.292	1.201
1939 Pack, cases.....	269,888	16,097	797	48,209	196,887	620,595	386,584	1,539,057
Grade B, cases.....	3,444½	11	20	17	142½	45,667	1,068	50,370
Per cent.....	1.276	.068	2.509	.035	.072	7.358	.276	3.272
1940 Pack, cases.....	366,403	17,741	1,205	23,277	201,467	213,911	643,443	1,467,227
Grade B, cases.....	1,778½	57	.....	13	461	2,530	3,298½	8,138
Per cent.....	.485	.321	.....	.054	.228	1.182	.512	.554
1941 Pack, cases.....	445,297	50,476	3,454	30,027	361,380	427,766	920,470	2,248,870
Grade B, cases.....	1,186½	152½	2	33	539½	64,866	25,161½	91,941
Per cent.....	0.260	0.301	0.057	0.109	0.149	15.163	2.733	4.088

REPORT OF THE DEPUTY MINISTER

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Species	Purchases		Shipped from B.C. to other Canadian Ports		Exported to U.S.		In Cold Storage		Liver Oil		Total Value or Prepared for (Marketed)
	Lbs.	Value to Fishermen	Lbs.	Value	Lbs.	Value	Lbs.	Value	Lbs.	Value	
Gray Cod.....	46,115	\$ 2,330		\$	5,621	357		\$ 9	20,108	2,457	\$ 2,823
Halibut Livers.....	314,269	142,249			47,071	20,658		30,416	30,793	137,332	188,406
Halibut Viscera.....	1,033,648	214,239						8,259	28,741	266,540	274,799
Black Cod Livers.....	52,629	30,843	750	221	16,606	6,489	8,757	3,125	4,347	26,240	36,075
Black Cod Viscera.....	179,832	29,794					35,140	4,191	2,978	19,320	23,511
Ling Cod Livers.....	94,166	58,161	2,500	1,550	70,908	44,823	14,527	7,015	9,146	15,482	68,870
Red Cod Livers.....	8,935	4,043	265	32	698	253	7,342	1,918	395	3,600	5,803
Red Cod Viscera.....	17	2									
Dogfish Livers.....	3,552,576	331,737			9,061	3,350	165,390	25,978	2,347,118	531,355	560,683
Soupin Shark Livers.....	23,191	51,509			18,094	37,030	1,755	7,830	10,266	23,262	68,122
Salmon Livers.....	69,986	3,499			40,540	2,903	22,845	1,039	7,450	2,431	6,373
Mudshark Livers.....	13,602	1,065							4,843	651	651
Ratfish Livers.....	7,081	288					5,208	184	1,205	127	311
Sole Livers.....	900	225					100	9	259	560	569
Mixed Viscera.....	65,170	8,472					74,890	9,736			9,736
Mixed Vitamin Oils.....									7,670	1,227	1,227
Total Values.....		878,456		1,803		115,863		99,709		1,030,554	1,247,959

NOTE.—The marketed values of fish viscera shown above are nominal, and do not indicate the actual purpose of this by-product, which is merely used in conjunction with other fish oils for the extraction of vitamins.

SPAWNING REPORT—1941

It is most satisfactory to be able to report that, notwithstanding a record salmon pack in British Columbia, the seeding of the spawning grounds has been found to be well above average, save in the case of the pink variety. The pink runs, particularly in the northern waters, were disappointing, but extra restrictions were placed on the fishing, which permitted a larger percentage of the fish than usual to reach the spawning grounds. Water conditions, apart from several small areas, were very favourable, and freshets have done little, if any, damage.

SCKEYES

This variety was found in abundance in the usual areas. The Naas, Skeena, Bella Coola and Rivers Inlet watersheds were amply supplied and other less important areas received satisfactory seedings. In the case of the Fraser River watershed, notwithstanding the difficulty experienced at Hell's Gate, the seeding by sockeye in the Chilco river and lake watershed was over 200 per cent better than that of the brood year of 1937. This year's estimate is 350,000 spawners compared with 110,000 in 1937. This watershed has been building up very satisfactorily in recent years. In the Stuart Lake, Francois Lake, and Quesnel Lake systems the spawning was heavier than in the brood year. In the Shuswap area the run was practically a failure, although no heavy return was expected in that district during the year under review. Sockeye spawning was above average, also, in the Hayden Bay, Sproat, Stamp, Anderson and Nimpkish River systems.

SPRINGS

The seeding by this variety can be considered a good average, generally speaking.

COHOES

The supplies of cohoes found on the spawning grounds were, as a rule, excellent, many of the fish being very large individually.

PINKS

In the areas north of Vancouver Island the pink supply was entirely inadequate, though, through extra closed seasons, a larger percentage of the runs than usual was saved for the spawning grounds. One outstanding exception was at Bella Coola, where the pink spawning grounds are reported as being filled to capacity. The seeding of the Skeena River district was an improvement over the brood year of 1939. A heavy seeding of pinks was also reported in the Harrison Lake district, including the streams tributary to the Fraser from Harrison Lake down to the mouth of the river.

CHUMS

A splendid seeding by chums was observed, particularly in the areas around Vancouver Island and the mainland opposite, notwithstanding a record catch of this species.

A more detailed description of the conditions found follows:—

Queen Charlotte Islands.—There was the usual showing of sockeye in several of the streams in the Massett Inlet area and Copper River. These, however, are of little commercial value and the only serious toll taken of the runs is by the Indians for their own food purposes. Coho seeding was found to be heavy. This being an "off" year for pinks the seeding, as expected, was very light. Generally speaking, the chum seeding was satisfactory, except in the streams tributary to Cumshewa and Sewell Inlets.

Naas Area.—The Meziaden Lake district is the chief sockeye spawning grounds of this watershed. The inspecting officer refers to an early and late run. By the former, he means the quantities of salmon actually seen on the spawning grounds around Meziaden Lake, by the latter the last part of the run which is proceeding up the Meziaden River, through the fishway, to the lake. The seeding by the early run is reported as heavy, an improvement over showings of the years 1936 and 1940 and similar to the heavy run of 1937. The seeding by the late run was also fairly heavy; not quite up to that of 1936, but exceeding those of the years 1937 and 1940. The general seeding by sockeye over the whole Naas area, including the tributary streams between Meziaden and salt water, has evidently been very satisfactory.

The fishway in the dam at the outlet of Meziaden Lake is in good condition and continues no obstruction to the ascent of salmon. Spawning conditions over the whole area were good.

Whilst the supply of spring salmon on the spawning grounds in the upper reaches of the watershed is reported as being quite good, the lower tributary streams contained an unusually heavy run. The supply of spawning coho observed in the several streams frequented by these fish is reported as being the best since 1938. The seeding at all points is reported as heavy. The pink seeding is estimated as a good average and better than was expected from indications in the commercial fishing areas. In the three principal pink salmon streams, the Quinnimas, Ikginik and Khutzemateen, the escapement was better than in the cycle year, 1939. The supply of chums on the spawning grounds is reported as a good medium.

Skeena Area.—The Babine lake and river section, which is the principal sockeye spawning area of the watershed, was supplied with a satisfactory quantity of sockeye eggs. There was some waste of eggs at Pierre Creek and Fifteen Mile Creek, and these points will require some attention in the future. The conditions for spawning were good as there has been very little frost and plenty of water to cover the eggs. The number of salmon taken by the Indians for food purposes was smaller than expected, owing to the Indians' absence for haying operations, employment in mines, and local sawmills. The supply of springs is reported as fairly heavy, cohoes as a heavy run, and the pinks as fairly heavy. In the Kispiox watershed the inspector's report refers to the supplies of sockeye, springs and cohoes as heavy and to a medium run of pinks. In the Lakelse Lake area, heavy supplies of sockeye were observed at Williams Creek, which contains the principal spawning beds. A satisfactory supply was also found at Schullabuchan Creek and satisfactory quantities in the smaller Granite Creek. There was a heavy seeding by cohoes in this area. The pink seeding was reported as good, and an improvement over the cycle year of 1939. On the spawning grounds of the streams tributary to the Skeena River, below Lakelse River, satisfactory quantities of springs, cohoes and pinks were found. The chum seeding was light, but the Skeena watershed is not a prolific chum area.

Lowe Inlet.—Due to heavy rains during the latter part of September and the most of October, together with unusually strong winds, it was impossible to inspect all sockeye spawning grounds. The supply found, however, is reported as fairly heavy, generally speaking, comparing favourably with the heavy spawning of 1936. The escapement to the streams on the west coast of Banks Island is reported as very heavy, and a decided improvement over that of the brood year. The weather during the sockeye run was hot, with no rain, and it was found necessary to enforce special closures until the rains arrived. The supply of cohoes in most streams was found to be heavy, and compared favourably with the heavy spawning for the brood year of 1938. The pink

run was disappointing, although the seeding, due to extra conservation measures, was better than expected. On the whole, however, the pink situation was found to be not good. The spawning was the heaviest in the streams in the northern portion of the area. On the other hand, the chum seeding was found to be quite satisfactory.

Butedale Area.—As the seining season was the driest in the past nine years, it was necessary to close a considerable portion of this area to ensure a proper escapement to the spawning grounds. The sockeye spawning, although never very extensive here, was found to be the lightest for some years past. The average escapement in the southern part of the area was below that of 1937, but to the major spawning grounds, such as the Qua Qua and Talamoso Inlets, was very satisfactory. The coho seeding is reported as excellent, although not quite as good as in the cycle year of 1938. The pink supply was normal for this "off" year cycle, but owing to lessened fishing intensity an increased percentage of the run reached the spawning grounds. The chum seeding was better than normal, an increase over the cycle year of 1937, which had been considered a fair year.

Bella Bella Area.—On the whole, the salmon escapement was satisfactory, the sockeye seeding being a medium one, cohoes reported as heavy, pinks medium, and chums heavy, in comparison with the brood year showings. Water levels were favourable.

Bella Coola Area.—Owing to there being no seaplane service available, the inspection of this difficult area was made on foot. Much time was lost in clearing a passable trail over a distance of approximately fifty miles from salt water. Conditions were unusually difficult because of a continuous downpour of rain which flooded the areas through which the trail passes.

In the Bella Coola and Atnarko River system the supply of sockeye on the spawning grounds was found to be entirely satisfactory—a distinct improvement compared with the brood year. A noticeable feature was the almost total absence of "runts" which are usually much in evidence in this area. The run of springs is reported as heavy, equal to that of last year, which was the best in the eighteen-year experience of the inspecting officer. This is reported as being the third successive heavy spawning of springs in the area. The coho supply was up to usual level. All the pink salmon spawning grounds are reported as being filled to capacity. The chum supply was found to be good and a decided increase over that of the brood year, the spawners being found in nearly all tributary streams as well as in the usual creeks.

Rivers Inlet Area.—The inspecting officer states that he is more than satisfied with the escapement of sockeye to the Owekano Lake system, which is the spawning ground of the sockeye, particularly in connection with the supply of five-year-old fish. The escapement to the Waukwash River was better than average and that area was well seeded. At Indian River every bar is reported as being covered with spawning sockeye, and more springs were observed than in past years. At Shumahault River more sockeye were observed than for some years. At Genesi Creek the inspecting officer reports the best showing and the greatest number of fish he had ever seen in the creek and spawning conditions perfect. Conditions at Nookins River were good. At Asklum River the beds are reported as being well seeded with sockeye. At Quap River the inspecting officer found the bed of the stream literally covered with spawning sockeye, and refers to the escapement as huge. The Whonnock River is reported as being heavily seeded by sockeye, and springs, cohoes and chums were also observed in good quantities. The inspecting officer states that the sockeye run was earlier than usual, that the greater part of the escapement

is comprised of five-year-old sockeye, that the area in general has been well seeded, and, although a heavy freshet occurred in the middle of October, little, if any, damage was done to the spawning grounds. In connection with the escapement of fall salmon the report reads that coho spawning was better than usual, the pink supply very good, and chum spawning good.

Smiths Inlet Area.—There are only two important sockeye spawning grounds in this area. The principal one is the Geluck River where the seeding was found to be good. In the second river, the Delabah, and in the lake at the mouth of the river, very considerable quantities of sockeye were observed and the seeding is rated quite adequate. The seeding of springs was reasonably good and this also applies to the cohoes and pinks, but the chum supply was only fair.

FRASER RIVER WATERSHED

Prince George Area.—This spawning area is divided into two definite districts—the Stuart Lake watershed and the Fraser Lake-Francois Lake watershed. The quantities of sockeye appearing on the spawning grounds in both show a decided increase over those of the brood year of 1937, although the supplies of salmon, of course, are still infinitesimal compared with the large runs of this cycle previous to its destruction at Hell's Gate in the fall of 1913. The run of springs which is found in the Upper Nechaco River, Stuart River, and in the upper portion of the Fraser River was normal. Spawning conditions of both varieties were good throughout both areas, and the salmon arrived in good physical condition.

Quesnel Area.—In the Bowron River watershed the run of sockeye salmon showed a considerable increase over that of the brood year. This also applies to the Horsefly system. The spring salmon run was normal. Spawning conditions were favourable. A suprisingly large return of sockeye was found in the Chilco Lake and Chilcotin River system, the inspecting officer estimating a total of 350,000 spawners compared with 110,000 in the brood year of 1937, notwithstanding that considerable difficulty had evidently been experienced by the salmon in reaching the spawning grounds, as evidenced by the wounds and bruises appearing on a large percentage of the fish. An average supply of spring salmon was observed to this system. Spawning conditions were good.

Kamloops Area.—The principal sockeye spawning grounds are found in the Shuswap, Adams river and lake systems. Only a small return was expected this year but, even so, the return was very disappointing, only a few sockeye being found in Adams River and in Raft River, a tributary of the North Thompson. An average supply of spawning springs was observed. Spawning conditions were favourable.

Pemberton Area.—In the Seton-Anderson Lake system approximately 1,200 sockeye were passed over the counting fence. Approximately another 800 spawned in Seton Creek, below the fence, and in the Fraser River. This compared with approximately 50,000 observed in the system in the brood year of 1937. In this connection it is interesting to recall that at certain stages of the water at the rapids in the Fraser River, at the outlet of Bridge River, sockeye have had difficulty in passing upstream and it has been observed that in some years when most difficulty was experienced much larger quantities of sockeye were found in the Anderson-Seton Lake system, the inference being, as previously pointed out, that they may have dropped back from Bridge River rapids. A good supply of spawning sockeye was observed in the Birkenhead River system, an increase over that of the brood year. These fish are reported as having been in good physical condition. A substantial run of springs was also observed. The coho seeding is reported as favourable and

was continuing at the time of inspection. In the Squamish River watershed a satisfactory seeding by springs was found on the spawning grounds. The coho seeding was satisfactory and was continuing at the time of inspection. The supply of pinks was estimated as medium heavy, an increase over that of the brood year. An exceptionally heavy seeding of chum salmon occurred. In the Howe Sound portion of the district the several tributary creeks showed a light seeding of coho, a good seeding of pinks and chums.

Hope Area.—Unusual numbers of sockeye salmon were found in most of the small streams tributary to the Fraser in this area. This was undoubtedly due to the difficult water conditions at Hell's Gate which evidently prevented a portion of the run passing above this point. They no doubt dropped back to the smaller streams below the gate. At Kawkawa Lake and Sucker Creek, for instance, the limited spawning grounds were crowded with sockeye, the fish showing numerous bruises. A similar condition was observed in 1930 when the run of sockeye to the Fraser exceeded, as it did in the year under review, all expectations. In that year the Fraser tributaries for 65 miles below Hell's Gate were crowded with sockeye. There was an average spawning of springs and a light supply of chum salmon this year.

Chilliwack Area.—The principal sockeye spawning ground in this area is at Cultus Lake where at the time of inspection over 18,000 of these fish had been counted over the fence. This compared with approximately 2,900 sockeye in the brood year of 1937. Coho were found in all streams tributary to the Chilliwack River, equal in numbers to the medium run in the brood year. The pink seeding is reported as heavy and a very definite increase over the brood year of 1939. A heavy spawning of chums also occurred, large individual specimens predominating. Spawning conditions were favourable.

Harrison Lake Area.—The principal sockeye spawning grounds here are the Morris Creek system and Silver and Douglas Creeks, tributary to Harrison Lake. Some 10,000 sockeyes were observed spawning at Morris Creek, which is a very considerable increase over the spawning of the brood year. A normal spawning occurred at Silver and Douglas creeks. A satisfactory spawning of springs occurred in the Harrison River. The coho supply is reported as light. A very heavy seeding of pinks is reported, which extended to the streams tributary to the Fraser River between the outlet of Harrison River and New Westminster. This also applies to chums.

Pitt Lake Area.—The spawning of sockeye in this area compared favourably with conditions in recent years. The quantity appeared to be adequate. A light run of springs was observed. A fair seeding of cohoes, pinks and chums is also reported.

Lower Fraser Area.—The Nicomekl and Serpentine Rivers were both well seeded by coho.

North Vancouver Area.—The coho seeding was found reasonably good, the pinks substantial, and the chums abundant.

OTHER AREAS

Alert Bay Area.—The sockeye seeding here was entirely satisfactory. At the Nimpkish River, the most important stream, the seeding is reported as heavy, and much greater than that of the brood year. A satisfactory seeding occurred at Fulmore River, with fair supplies at Keough River, Gledale Cove, McKenzie River and Kahweiken River, Thompson Sound. Light supplies, comparable to the brood year, were observed in Shushartie and

Nahwitti rivers. The spring seeding was normal with heavy runs at Wakeman and Kleena Kleene rivers. The Adams River seeding was light. Practically all streams were well supplied with coho eggs, and the inspecting officer comments on the unusually large size of the individual fish, some weighing up to twenty and twenty-two pounds. The heaviest seeding of pinks occurred at Wakeman River, Keough River, and at all streams in Knight Inlet. The seeding at Bond and Kahweiken rivers was an improvement over that of the brood year, but the showing at Adams and Klucksivi rivers was only about fifty per cent of that of 1939. An exceptionally heavy seeding by chums was observed throughout the whole area.

Quathiaski Area.—The sockeye seeding in the Hayden Bay area is reported as very heavy, and the sockeye run at this point is undoubtedly increasing. The escapement at Phillips River is also reported as very heavy, compared with that of the brood year. The spring seeding was normal. The coho seeding was excellent throughout the district. The pink supply was poor and considerably lighter than in the brood year of 1939. This, of course, was the "off" year for pinks in the area. The chums were very plentiful on the spawning grounds and the seeding is reported as very heavy, compared with the years 1937 and 1938.

Comox Area.—This is not a sockeye area. The spring seeding at Puntledge River was disappointing. The supply of cohoes on the spawning beds was found to be very satisfactory, particularly at Puntledge and Courtenay rivers. The inspecting officer comments, for the second year in succession, on the large number of two-year-old cohoes. Even for an "off" year, the pink seeding was poor, although in the Tsoleum River a better supply was expected as a result of the good seeding in 1939. There was a fair showing in Morrison Creek, tributary to the Puntledge. The chum supply is reported as extremely heavy and much in excess of the brood year of 1937. The inspecting officer remarks on the definite rehabilitation of this run to numerous small streams in Bayne Sound, and the continued improvement at Oyster River where the chum run is reported as being of very recent origin. The seeding of both Qualicum rivers was also heavy.

Pender Harbour Area.—The only sockeye stream of any value in this area is Saginaw River where the 1941 escapement was considerably greater than that of the brood year. The seeding of springs was average. The coho supplies were found to be very good, an increase over those of the brood year in most of the streams. The seeding was particularly good in the Toba Inlet area. The spawning of pinks is considered inadequate, although an exception was observed in the streams tributary to Jervis and Sechelt inlets. An unusually heavy seeding of chums was found and was reported as the heaviest spawning for many years. All streams throughout the district are reported as being filled with this variety.

Nanaimo Area.—In the small streams lying between Englishman's River and Nanaimo the return of cohoes to the spawning grounds was about the same as in 1938, the brood year. The spawning grounds of the local streams carried chum salmon in greater quantity and over a longer spawning period than is usually the case. Spawning was much heavier than in the years 1937 and 1938.

Ladysmith Area.—There was a good average seeding of springs and a noticeable improvement in the supply of cohoes. The usual few pinks were observed, although this is not a pink area. The chum seeding is reported as much better than the years 1937 and 1938.

Cowichan Area.—The seeding of springs is reported as very good and the coho supply is stated to be the largest in the experience of the local inspector. The officer also speaks of the chum seeding as the biggest he has ever seen. The steelhead supplies are apparently being well maintained.

Victoria Area.—The coho seeding was a fair average, though smaller than that of the brood year when the run was exceptionally large. The chum seeding is reported as very satisfactory.

Alberni Area.—The sockeye areas here are the Somass, Anderson and Hobarton river systems. The escapement to the Somass is reported as the best in the last thirteen years. This is also true as regards Sproat Lake and its tributaries. There was an excellent seeding in the Anderson system. The escapement to the Hobarton area was very good. The seeding of springs in the Somass, Nahmint, Sarita, Toquart and Nitinat areas, which are those frequented by this species, was good. The coho escapement was exceptionally good in all streams frequented by these fish. The chum seeding is reported as the heaviest since 1936, both in the Barclay Sound and Nitinat areas. The inspector for the district reports that the runs, both from a commercial catch and spawning ground standpoint, have been the best for many years.

Clayoquot Area.—The sockeye seeding in the principal spawning areas of Kennedy Lake system is reported as extremely satisfactory. The coho supplies were found to be very heavy, the runs showing a considerable increase during the last three or four years. The chum seeding was good and heavier than that of the brood year and also last year.

Nootka Area.—The usual small supply of sockeye, not commercially important, was found on the spawning grounds. The spring seeding was normal. The coho supplies, which are never large in this area, provided an average showing. The chum seeding was the best in years.

Kyuquot Area.—The spring seeding was very good, compared with previous years, and the supply of cohoes showed an increase over that of the brood year. There was a heavy escapement of chums, notwithstanding the largest catch of this variety in many years.

Quatsino Area.—The sockeye runs to this area are never of much importance commercially, but the seeding in the year under review was normal. The spring seeding is reported as medium. The coho supplies, on the other hand, were above average. This was an "off" year for pinks and only a light seeding was observed. The chum seeding was reported as normal, although the run of this variety was considered light. Fishing operations, however, were not as intensive as usual.

APPENDIX No. 3

ANNUAL REPORT ON FISH CULTURE

BY

J. A. RODD, *Director of Fish Culture*

Fish cultural operations in 1941 were carried on by the Department of Fisheries in Nova Scotia, New Brunswick and Prince Edward Island, where the fisheries are entirely, or to a large extent, under federal administration. In addition over 1,000,000 sockeye salmon eyed eggs were planted in Hillier Creek, Maggie Lake, Vancouver Island, British Columbia, in continuation of the stocking effort, resumed in 1937, to add these waters to the sockeye producing areas of the Barclay Sound district.

Thirteen main hatcheries, one subsidiary hatchery, six rearing stations, six salmon retaining ponds and several egg collecting camps were operated. The total output from these establishments was 29,635,654, over 83 per cent of which was distributed in the fingerling and older stages. The output by species, hatcheries and provinces was:

STATEMENT BY SPECIES OF THE FISH AND FISH EGGS DISTRIBUTED FROM THE HATCHERIES DURING THE YEAR ENDED DECEMBER 31, 1941

Species	Eyed Eggs	Fry	Advanced fry	Finger-lings	Year-lings and Older	Total Dis-tribution
Salmo salar—Atlantic salmon.....		100,000	2,894,500	12,086,153	90,684	15,171,337
Salmo irideus—Rainbow trout.....				386,645	223	386,868
Cristivomer namaycush—Salmon trout.....				67,550		67,550
Salmo salar sebago—Sebago salmon.....					39,235	39,235
Oncorhynchus nerka—Sockeye salmon..	1,030,296					1,030,296
Salvelinus fontinalis—Speckled trout...		309,000	576,090	12,009,837	45,441	12,940,368
	1,030,296	409,000	3,470,590	24,550,185	175,583	29,635,654

THE FOLLOWING TABLE SHOWS THE HATCHERIES OPERATED, THEIR LOCATION, DATE OF ESTABLISHMENT, THE SPECIES AND THE NUMBER OF EACH SPECIES DISTRIBUTED FROM EACH HATCHERY DURING 1941

Estab- lished	Hatchery	Location	Species	Eyed eggs	Fry	Advanced fry	Fingerlings					Year- lings and Older	Total distrib- ution by species	Total distrib- ution by hatcheries
							No. 1	No. 2	No. 3	No. 4	No. 5			
1929	Antigonish.....	St. Andrews, N.S.....	Atlantic salmon				695,000	183,389					878,389	
			Rainbow trout.....				43,780						43,780	
1876	Bedford.....	Bedford, N.S.....	Speckled trout.....			75,000	2,656,317	156,000	63,000	25,050		13,554	2,988,921	3,911,090
			Atlantic salmon.....						60,900				60,900	
1937	Cobequid.....	Jackson, N.S.....	Speckled trout.....			175,000	17,715	235,000	102,267	13,553			17,715	78,615
1938	Coldbrook (f).....	Coldbrook, N.S.....	Atlantic salmon.....				277,730						1,061,820	
1936	Grand Lake (f).....	Wellington Station, N.S.....	Speckled trout.....						37,000				277,730	1,339,550
			Atlantic salmon.....					11,000	192,800	110,000			37,000	
1937	Kejimikujik (f).....	New Grafton, N.S.....	Speckled trout.....										120,527	187,597
1912	Lindlof.....	St. Peters, N.S.....	Atlantic salmon.....										401,980	
1902	Margaree.....	N.E. Margaree, N.S.....	Speckled trout.....										5,290	
1935	Mersey River (f).....	Liverpool, N.S.....	Atlantic salmon.....			258,430	1,298,000	290,000	210,000	160,000	80,420	5,009	2,272,859	4,012,019
1913	Middleton.....	Middleton, Annapolis Co., N.S.....	Speckled trout.....						1,697				251,700	
			Atlantic salmon.....					9,100	285,000				1,697	253,397
			Salmon trout.....				50,000	17,550					294,100	
1933	Nictaux Falls (f).....	Nictaux Falls, N.S.....	Speckled trout.....				10,000	180,000	152,225			100	342,825	703,975
1929	Yarmouth.....	South Ohio, N.S.....	Atlantic salmon.....				247,400						247,400	247,400
			Rainbow trout.....				66,785	42,850	81,748	29,824		2,504	223,711	
1939	Charlo.....	River Charlo, N.B.....	Speckled trout.....			36,660	237,280	202,672	22,504	4,040	9,291	3,159	515,666	739,600
1928	Florenceville.....	Florenceville, N.B.....	Speckled trout.....		34,000		439,310	1,274,434	60,000				1,773,744	
			Atlantic salmon.....				2,000		76,500				112,500	1,886,244
			Sebago salmon.....				470,000	774,899					1,244,899	
1880	Grand Falls.....	Grand Falls, N.B.....	Speckled trout.....				1,580,472					1,000	1,590,845	2,836,744
1874	Miramichi.....	South Esk, N.B.....	Speckled trout.....		100,000	250,000		136,000	63,667			10,373	1,490,467	
			Atlantic salmon.....		275,000		289,000	156,000	335,302				1,055,302	2,545,769
1914	Saint John.....	Saint John, N.B.....	Speckled trout.....			1,874,500	841,800	438,562					3,154,862	
			Atlantic salmon.....				85,000	136,900					221,900	3,376,762
			Rainbow trout.....			345,000	398,853	4,000	5,186				753,039	
1938	Cardigan (f).....	Cardigan, P.E.I.....	Speckled trout.....			121,000	773,700	118,750	81,500	26,000	1,864	825	1,123,639	1,892,058
			Atlantic salmon.....				10,000	18,000	16,845				44,845	
1906	Kelly's Pond.....	Southport, P.E.I.....	Speckled trout.....			250,000	20,000		116,000	7,000			143,000	
			Atlantic salmon.....				231,080		302,000	11,673			313,673	501,518
1911	Anderson Lake (a) Kildonan, Vancouver Island, B.C.....	Anderson Lake, Kildonan, Vancouver Island, B.C.....	Rainbow trout.....				147,485						481,080	
			Speckled trout.....				424,000	23,100					147,485	
			Sockeye salmon.....										447,100	1,075,665
													1,030,296	1,030,296
				1,030,296	409,000	3,470,590	15,691,407	5,357,456	3,022,607	387,140	91,575		175,583	29,635,654

(a) Subsidiary hatchery.

(f) Rearing station.

The eggs, fry and fingerlings included in this distribution, with the exception indicated, were from collections in the autumn of 1940 and the spring of 1941.

HATCHERY OUTPUT, BY PROVINCES, OF EYED EGGS, FRY, FINGERLINGS, YEARLINGS AND OLDER FISH DURING 1941

[illegible]

The Anderson Lake hatchery, Vancouver Island, British Columbia, was operated for a short period and over a million sockeye salmon eggs collected, eyed at the hatchery, and planted in Hillier creek at the head of Maggie Lake. Natural spawning in the Anderson Lake area was reported to have taken place under very favourable conditions and apparently the area was well seeded.

Some 34,915 Atlantic salmon fingerlings were marked by the removal of the adipose and one side fin, either a pectoral or a ventral, and distributed from the Cobequid and Charlo hatcheries, bringing the total of marked Atlantic salmon in all hatcheries from 1935 to 1941 inclusive to 820,272. The tagging of Atlantic salmon by affixing a numbered tag to the dorsal fin, which was commenced in 1913, was continued on a limited scale at the Margaree Pond. Four such salmon that had been tagged at this pond in previous years and that had been to sea were reported, 2 from points not far distant, and 2 from the harbour where they had previously been marked and liberated. Four that were tagged and liberated in the harbour were taken a short time later—three from Margaree River pools by anglers and one at the harbour net. Seventeen that had been tagged and liberated at River Philip, Nova Scotia, were reported from different parts of the coast, from the river where they had been liberated and one as far distant as Newfoundland. There was one reported recapture each from the New Mills and St. John taggings. A considerable number of speckled trout fingerlings and older fish were marked by the removal of the adipose and one of the side fins and distributed from most hatcheries and rearing ponds.

The recapture of these marked and tagged fish, if reported, will add to present data in regard to the "homing" theory, sea movements or migrations of salmon, and the growth, survival and migration of trout. A reward of one dollar is paid for information as to the date, length, weight and place of recapture of each salmon, accompanied by the tag, a number of scales, and the scars left by the removal of the fins. The percentage of fin clipped fish that have been reported from the different districts varies greatly in regard to the number that are marked in this way. Apparently the anglers and residents of some districts are not prepared to co-operate to the extent of reporting the taking of marked fish by post-cards provided by the Department or by reporting verbally to the nearest fishery officer, although at the same time they do not hesitate to complain if the angling is not as good as it used to be when the fishing effort was only a fraction of what it is at the present time. The nature of the information that might be made available by full co-operation of the public is indicated by the returns from Chamcook Lakes, New Brunswick, where the sebago salmon hatchery fish are marked before they are liberated. A similar course is followed with sebago salmon at Grand Lake, Nova Scotia. During the collection of salmon eggs at Chamcook Lakes this year, out of a total of 141 fish 41 or 29 per cent bore the hatchery mark. This percentage during the past six seasons averaged 31.2 per cent. At Grand Lake 39.5 per cent of those taken in 1940 and 38.4 per cent of those taken in 1941 were hatchery marked fish. In addition, considerable numbers of marked fish are taken by anglers in these waters.

Prophylactic and sanitary measures were practised on a rather extensive scale at all hatcheries and rearing ponds, and experiments with equipment, methods and foods of various kinds were continued.

As the prices of beef liver, at one time the standard fish food used in fish cultural work, and other meat products have increased to such an extent, with corresponding increases in the production costs of hatchery fish, fish culturalists generally have been experimenting for many years with a great variety of foods and combinations of foods with the hope of finding less costly and equally or more efficient rations for hatchery fish.

A notable and important advance was made on behalf of this Department towards the solution of this feeding problem inasmuch as Doctor W. D. McFarlane, Professor and Chairman of the Department of Chemistry, Macdonald College, McGill University, undertook an investigation of the composition of some natural foods of Atlantic salmon and speckled trout fry in the Maritime Provinces during 1940. From the result of these analyses, he formulated rations that approximated as closely as possible the composition of the natural food and these were tested out at the different hatcheries during 1941. In all 23 different ingredients were used in various combinations and 96 tests were made.

Some of the rations tested gave very promising results, inasmuch as the mortality percentage was low and the cost in food of producing one pound of fish was considerably smaller than it was with the standard meat products. On the basis of the results obtained from these tests under varying conditions that prevailed at the several hatcheries and rearing ponds in 1941, an even more comprehensive series of tests will be undertaken during the coming year.

A modified potato ricer was tried out experimentally at several hatcheries as a means of feeding the rations in worm-like form. Results justified further experiments in this method of feeding and modified ricers will be used to a larger extent at several establishments next season.

The Charlotte County Lakes management was continued as planned. The closure was removed with the opening of the speckled trout season on April 1, and a creel census was taken in Johnson and Kerr Lakes. Johnson Lake (34 acres) received 459 and Kerr Lake (177 acres) received 2,390 marked speckled trout yearlings in 1939. While the angling season extends from April 1 to September 30, the first and last trout were caught respectively on May 5 and July 30 in Johnson Lake and on April 30 and August 30 in Kerr Lake. The yield was low, being only 0.9 and 0.4 pounds per acre respectively. The number of marked fish reported was also small, being only one in Johnson Lake and fourteen in Kerr Lake. The monthly creel census results in 1941 were:—

Johnson Lake	April	May	June	July	Aug.	Sept.	Totals
Number of fishermen.....	0	38	13	3	0	0	54
Fish Caught.....	0	63	12	4	0	0	79
Marked.....	0	1	0	0	0	0	1
Unmarked.....	0	62	12	4	0	0	78
Hours fished.....	0	109.5	29.5	8.5	0	0	147.5
Fish per hour.....	0	0.57	0.40	0.47	0	0	0.53
Average weight (oz.).....	0	8.0	6.8	10.4	0	0	8.0

Kerr Lake	April	May	June	July	Aug.	Sept.	Totals
Number of fishermen.....	7	124	56	47	32	0	266
Fish Caught.....	2	139	38	37	17	0	233
Marked.....	0	7	4	2	1	0	14
Unmarked.....	2	132	34	35	16	0	219
Hours fished.....	29	319	138.75	114	61.5	0	662.25
Fish per hour.....	0.07	0.43	0.27	0.32	0.27	0	0.35
Average weight (oz.).....	6.0	6.1	5.9	5.7	5.2	0	6.0

Welch Lake (43 acres) and Gibson Lake (57 acres) were stocked respectively with 6,000 No. 2 and 1,560 No. 5 fingerlings in 1941. The closures will be removed from Limeburner Lake (129 acres) and Bonaparte Lake (105 acres), and along with Johnson Lake (34 acres) and Kerr Lake (177 acres), will be open to angling and a creel census will be taken in them in 1942.

Limeburner Lake was stocked with 3,484 No. 5 fingerlings and Bonaparte Lake with 14,180 No. 2 fingerlings in 1939. Ten thousand five hundred and thirty-five No. 2 fingerlings were distributed in St. Patrick Lake and 6,976 No. 2 fingerlings in Crecy Lake in 1940.

The fish distributed in Johnson, Kerr, Limeburner and Gibson Lakes were marked by the removal of the adipose and one of the side fins.

The Charlotte County Lakes management is a co-operative effort between the Fish Cultural Branch and the Atlantic Biological Station of the Fisheries Research Board. It comprises eight lakes within a radius of approximately fifteen miles and reasonably convenient to the Station. The biological studies were made by the staff of the Station, the area of the lakes was determined and the stocking plan was devised by Doctor M. W. Smith, a member of the staff. The fish are provided and all expenses due to guardianship and creel census are borne by the Fish Cultural Branch.

The plan calls for,—

1. The planting in rotation of trout of three different sizes, viz., No. 2 fingerlings, No. 5 fingerlings and yearlings;
2. The closure of the lakes until the trout planted in them are three years old, and then opening them to angling so that four of the lakes will be open and four closed to angling every year;
3. The maintenance of an adequate patrol to prevent illegal angling, and
4. Creel census to determine the value, in terms of the anglers' catch, of stocking lakes of this kind with hatchery fish of three sizes.

The lakes are closed the year following that in which they are stocked with yearlings, and the second year following that in which they are stocked with fingerlings.

The acreage of the lakes and the stocking schedules are as follows:

STOCKING SCHEDULE

Lake	Area (acres)	Number of Fish		
		No. 2 fingerlings	No. 5 fingerlings	Yearlings
Welch.....	43	5,810	1,162	581
Gibson.....	57	7,700	1,540	770
Limeburner.....	129	17,420	3,484	1,742
Bonaparte.....	105	14,180	2,836	1,418
Johnson.....	34	4,590	918	459
Kerr.....	177	23,900	4,780	2,390
St. Patrick.....	77	10,400	2,080	1,040
Crecy.....	50	6,750	1,350	675

SCHEDULE FOR STOCKING AND OPENING LAKES AND SIZE OF STOCK

Lake	Stocking year	Stock	Opening year	Stocking year	Stock	Opening year
Limeburner.....	1939	No. 5 fingerlings..	1942	1943	No. 2 fingerlings..	1946
Bonaparte.....	1939	No. 2 fingerlings..	1942	1943	No. 5 fingerlings..	1946
Johnson.....	1939	Yearlings.....	1941	1942	No. 2 fingerlings..	1945
Kerr.....	1939	Yearlings.....	1941	1942	No. 2 fingerlings..	1945
St. Patrick.....	1940	No. 2 fingerlings..	1943	1945	Yearlings.....	1947
Crecy.....	1940	No. 2 fingerlings..	1943	1945	Yearlings.....	1947
Welch.....	1941	No. 2 fingerlings..	1944	1945	No. 5 fingerlings..	1948
Gibson.....	1941	No. 5 fingerlings..	1944	1945	No. 2 fingerlings..	1948

The interest and co-operation of the local organizations which was referred to in a previous report has been continued. Provincial fish and game protective associations have co-operated, and the local fish and game clubs as well as angling and protective associations in many instances have assisted hatchery staffs as opportunity offered in the distribution of the season's output, particularly in waters in which these organizations are interested. Among those that were particularly helpful were the Fish, Forest and Game Protective Associations in the Middleton district, Nova Scotia, all branches of the New Brunswick Fish and Game Protective Association in the Saint John district, and Grand Falls, Madawaska, St. Leonards and Ste. Anne Fish and Game Clubs, New Brunswick.

Valuable and much appreciated advice and co-operation were extended whole-heartedly by the directors and staffs of the Atlantic Biological Station, the Atlantic Fisheries Experimental Station, and the Consulting Director of the Fisheries Research Board, all of which are referred to in the report of the Board.

Several transfers and promotions were made in the interests of increased efficiency during the year. Superintendent K. G. Shillington was transferred from the Antigonish to the Saint John hatchery; Superintendent W. D. Turnbull from the Margaree to the Antigonish hatchery; Superintendent J. W. Heatley from the Cobequid to the Margaree hatchery, and Superintendent F. F. Annis from Kejimikujik to the Yarmouth hatchery. Mr. P. B. Stratton was transferred and promoted from the position of Assistant at the Saint John hatchery to that of Superintendent at the Cobequid hatchery. Superintendent George Sutherland of the Florenceville hatchery was retired on superannuation on account of ill health and his position filled temporarily by Assistant T. K. Lydon and later by the transfer to Florenceville early in 1942 of Superintendent J. M. Butler of the Grand Lake rearing ponds. Assistant W. H. Cameron of the Antigonish hatchery was placed in charge, also temporarily, early in 1942, of the Grand Lake ponds.

These transfers carry with them promotion to a hatchery of higher grade with higher salary range or increased compensation in the way of a residence with light and fuel.

Owing to the conditions brought about by the war, operations were not expanded, new construction was not undertaken, and replacements and repairs were confined to essentials. Inspections of possible egg-collecting waters and hatchery and rearing-pond sites were also restricted to what might be done by fish cultural officers in the discharge of their regular duties.

The Canadian National, the Canadian Pacific and the Dominion Atlantic Railway companies continued their generous assistance and co-operation by furnishing free transportation for shipments of game fish and game fish eggs with their attendants. The extent of this co-operation is indicated in the following summary:

Railway	Total mileage on trip passes	Number of passages	Mileage baggage car permits			Number of cases or cans			Number of Permits
			Full	Empty	Total	Full	Empty	Total	
C.N.R.....	5,423	38	4,631	3,724	8,355	236	210	446	45
C.P.R.....	976	12	1,348	1,348	2,696	133	133	266	20
D.A.R.....			451	337	788	22	11	33	5
	6,399	50	6,430	5,409	11,839	391	354	745	70

NOTE.—Number of passages refers to transportation one way—a return trip counting as two passages. Number of permits refers to one way passages for cases or cans.

From 1899 to 1941 inclusive, rainbow trout have been distributed in fifty-six lakes and seven streams in the Maritime Provinces. Distributions were made in seven lakes and in two streams in 1899 and 1900. Forty-nine lakes and six streams received allotments from 1917 to 1941. These waters were examined by the District Supervisors of Fish Culture during the past two seasons. In only one, viz., Crooked creek, Albert County, New Brunswick, is there definite evidence of natural reproduction. Rainbow trout were distributed in this creek in 1900 and specimens of various sizes are still taken there. There is also some evidence of natural reproduction in the Giants Lake area, Smelt Lake and Lindloff Lake, Nova Scotia, but it cannot yet be said that the fish have become established in these waters. They provide good sport in Glenfinnan and O'Keefe's (Pisquid) Lakes, Prince Edward Island, particularly during the late summer and early autumn when the native speckled trout are out of condition or are protected by close season. There is, however, no visible outlet from Glenfinnan and a similar condition prevails during the greater part of the year at O'Keefe's Lake. Even during periods of highest water the outflow from O'Keefe's Lake is through a road culvert in which a fairly effective screen has been maintained.

In this country Atlantic salmon are seldom taken by fly fishing in fresh water lakes. Loch Lomond, Richmond County, Nova Scotia, is an exception in this regard and apparently fly fishing for salmon has improved in this lake in recent years. Consequently the question was raised by some local anglers as to whether the fish that they were catching were sea-going or non-sea-going salmon. The salmon whose scales have been examined had however spent one or two years in the sea.

A salmon which proved to be a "hermaphrodite" was spawned at Miramichi pond. The fish had a hooked nose and so far as colouring and outward appearance was concerned resembled a male. Its eggs were smaller than those usually obtained from a salmon of similar size but otherwise appeared normal. It is the second salmon of dual gender reported from the Maritime Provinces, although a number of "hermaphrodite" sockeye salmon have been observed during fish cultural operations in British Columbia. The previous Atlantic fish of dual gender was taken in the Restigouche River many years ago.

Collections, transfers and distributions are given to the nearest hundred in the summaries of operations at the respective establishments.

MARITIME PROVINCES

Senior District Supervisor of Fish Culture, James Catt

Although the appropriation did not permit of any expansion of operating plants, Fish Cultural operations in the Eastern Division continued to show progress during 1941 in a new record in ova collection and an expanded program of nutritional tests embracing desirable diets not only for rearing of salmon and trout stocks for distribution, but also for maintaining brood stocks of trout and landlocked salmon.

Four thousand, five hundred and eight Atlantic salmon were obtained for fish cultural purposes and retained. These included 2,552 purchased from fishermen and 1,956 taken in departmental traps. The average weight (pounds) of the salmon at each pond was: Margaree, 11; River Philip, 15; Sackville River, 6; Miramichi, 8.3; New Mills, 17; Jacquet River, 8, and Morell, 10. Some 21,925,800 eggs were secured, which, while slightly larger than last year, did not quite come up to expectations due chiefly to relatively small runs on the Sackville and Morell rivers and escapement of fish from a damaged retainer at the latter place.

Landlocked salmon ova collections were much increased over those of 1940 due to more successful operations at Chamcook Lakes, New Brunswick, and an increased number taken from brood fish in Grand Lake ponds, Nova Scotia.

Over 41,300,000 speckled trout eggs, an increase of 30 per cent over the preceding year were collected. At Antigonish a new record of more than 27,000,000 eggs was established. Collections at the Saint John and Lindloff hatcheries far exceeded their estimated output chiefly due to a heavy yield from the parent fish. The average egg production per female for pond fish, including yearlings, at Antigonish was 2,099 in 1941 and 1,128 in 1940, at Saint John 1,118 in 1941 and 801 in 1940 and at Lindloff 1,283 in 1941 and 915 in 1940.

Operations at Spear's brook, Lake Utopia, New Brunswick, resulted in an economically successful collection of excellent speckled trout eggs at a cost per thousand of less than one-half that of 1940. Ova obtained from sea trout at Tweedie's Meadow brook was over twice the quantity obtained at the same place in the preceding year. The previous year's collection of trout eggs was also exceeded at Cobequid, Yarmouth and Kelly's Pond hatcheries.

Rainbow trout egg collections from brood stocks were very satisfactory and were augmented by a present of 424,000 from the American Fish Culture Company, Carolina, Rhode Island, U.S.A.

Salmon and trout fingerlings, reared at the several hatcheries and ponds, were of excellent quality on the whole. Speckled trout at Lindloff hatchery, only 41 weeks old, were from 6¼" to 7¼" in length and averaged 2.25 ounces in weight. This particular strain was obtained from a cross between hatchery fish originating from selected stock and wild trout native to the Lindloff hatchery brook.

At the Mersey ponds a small number of speckled trout were reared for the first time. Mortality was comparatively low throughout the season and those distributed were of excellent quality.

Brood stocks of speckled trout were increased; the high average yield of fertile ova per fish at several plants demonstrates the excellent condition of the parents throughout the year.

Selective breeding was continued at the hatcheries carrying trout stock. Quick growing strains of high egg productivity have been established for some time. To these valuable characteristics must now be added generally greater uniformity in size of fingerlings. This condition now obtains to a promising degree in certain Antigonish hatchery strains that have been developed during several generations of careful selective breeding. It also is hoped that further selection will produce earlier spawners. Some progress has been made in this direction.

Examinations of lakes and streams, as listed in the annual reports of Supervisors Tingley and Hills, were somewhat more limited than expected.

To ascertain if fish eggs change in size between water hardening and hatching a group of the Atlantic salmon species were laid down at the Saint John hatchery on November 5, 1940, and 24 fluid ounces carefully measured and segregated on November 25. The loss up to February 27, when the eggs were well eyed, was 359. On that date this loss was replaced with 359 eggs from the original group and the test lot was remeasured. It was found that the bulk had increased from 24 to 26 ounces or a gain of 8.3 per cent. From February 27 to April 16 a further loss of 109 eggs was picked from the test lot. This was again replaced from the original lot and the test lot remeasured a second time. It was found the bulk had increased to 26½ ounces, a total increase of 2½ ounces or 10.4 per cent.

On first sight this looks as if the eggs had increased in size during the period November 25 to April 16—at any rate, the same number of eggs would not go into the same space at the latter date, or expressed in another way—a unit measure holds more green water hardened eggs than it does eyed eggs.

Whether this is due to increase in size in the individual egg or to more rigidity in the egg at the latter date and, consequently, less ability to closely pack together, is not definitely known.

The only hatchery stocks exhibited were those taken to the annual meeting of the Nova Scotia Guides Association at Lake William.

District Supervisor of Fish Culture, F. A. Tingley

During the year the Saint John, Florenceville, Grand Falls, Charlo, Miramichi, New Mills, Kelly's, Cardigan, Bedford, Middleton, Yarmouth, Coldbrook, Kejimikujik, Mersey, Grand Lake, Margaree, Margaree Pond, Lindloff and Antigonish establishments were inspected. Fin clipping was observed and methods of computing output by volume and weight were tested and demonstrated during these inspections as opportunities permitted.

Burpee and Lenihan brooks, Martin's pond, North River, Pritchard and Clear Lakes, N.B., and Graham Lake and Mersey River at Cowie Falls, N.S., were examined.

The material collected during the field work of the previous year was examined and classified at Saint John and a week was spent in a further identification of the more difficult specimens at the Atlantic Biological Station, St. Andrews, with the assistance of Drs. R. H. M'Gonigle and M. W. Smith. Specimens of Crangonyx, a fresh water amphipod, unknown elsewhere in the Maritimes, were collected from Pugg Lake in Shelburne County and forwarded to the station at St. Andrews.

Commercial salmon fishermen and fish dealers were interviewed in April, May and June to solicit their co-operation in observing and reporting marked salmon. In late August and early September survival tests were made with speckled trout fingerlings at Mulgrave and Porters Lakes and Halfway River, N.S.

While in the Restigouche area Supervisors A. P. Hills and self accompanied Messrs. Mowat, head and assistant guardians for the Restigouche Riparian Association, in an examination of the river from Kedgwick to Deeside to investigate the feasibility of re-stocking by out-board motor boat, and the prospects for taking and retaining adult salmon in this area for fish cultural purposes.

October and the first half of November were devoted to the installation and care of fish fences at Spear's brook, collection of speckled trout eggs at this point and at Tweedie's Meadow brook and delivery of the eggs respectively to the Saint John and Miramichi hatcheries. Assistance also was given with the collection of landlocked salmon at Chamcook Lakes.

District Supervisor of Fish Culture, A. P. Hills

Yarmouth, Middleton, Cobequid, Antigonish, Margaree, Margaree Pond, Lindloff, Nictaux, Bedford, Grand Lake, Coldbrook, Mersey, Kejimikujik, Florenceville, Grand Falls, New Mills, Jacquet, Charlo, Kelly's and Cardigan establishments were inspected.

Cochran, Loon, First, Corkum, Sand, Pritchard, Moose, Porter's, Green Hill, Clear, Midway, Pugg and Dolan's Lakes; Middle and Hunter Rivers and Lenihan brook were examined or visited.

Specimens collected were identified at Saint John and St. Andrews as also mentioned under Supervisor Tingley's section. The same inspection trip of the Restigouche was made conjointly with Supervisor Tingley.

A collection of seago salmon eggs was attempted at Clinch brook, tributary to Magaguadavic Lake, but only 28,300 were taken and assistance was given in stripping the same species at Chamcook Lakes and speckled trout at Spear's brook.

ANTIGONISH HATCHERY

K. G. Shillington and W. D. Turnbull, Superintendents

Superintendent Turnbull took charge of Antigonish hatchery on May 21 when the former Superintendent, Mr. Shillington, was transferred to the Saint John establishment.

A collection of 27,170,600 speckled trout eggs was made from the hatchery ponds. This exceeds last year's production by over 5,144,600 and sets a new all-time record for the number of eggs of this species taken from hatchery reared fish at any of the Maritime hatcheries. The eggs from the McRae Lake 3-year-old pond stock (early spawners) were taken from October 13 to 25 and from the other pond stock between October 31 and November 19. These collections were supplemented by receipt of 1,000,000 Atlantic salmon eggs from Bedford hatchery in March and April, by 30,300 rainbow trout eggs from Yarmouth in May and 30,000 of the same species from Saint John during the same month. Outgoing shipments of speckled trout eyed eggs in February and March were as follows: to Middleton 2,100,000, Lindloff 1,600,000, Glenora hatchery, Ontario, 150,000 (in exchange for salmon trout eggs sent Middleton hatchery), Charlo 210,000, Kelly's 1,400,000, Saint John 650,000, Yarmouth 1,325,000, Miramichi 500,000, Grand Falls 800,000 and Bedford 1,900,000. In June 3,500 speckled trout yearlings were moved to Saint John hatchery and in September and October 40,000 No. 4 fingerlings of the same species to Grand Lake ponds. Following the 1941 fall collections the following speckled trout green eggs were shipped in November: to Middleton 1,802,300, Yarmouth 2,008,100 and Bedford 2,026,100. The following distributions for the year were made—878,400 Atlantic salmon, 43,800 rainbow trout and 2,988,900 speckled trout. These include 13,554 speckled trout one year and older marked by the removal of the adipose and right pectoral fins.

In selective breeding, fifty groups of eggs from selected pairs of two-year-old stock were segregated. These fish averaged 3,787 eggs per female—the lowest yield being 3,067 and the highest 5,112. Selections were made on the basis of size of parents, number and quality of eggs, early spawning and general appearance. The average egg yield per female held in ponds has increased progressively in the last four years. The average yield for one-year fish in 1938 was 439, in 1939, 751, in 1940, 910, and in 1941, 1,068; for two-year fish in 1938 it was 1,058, in 1940, 1,916, and in 1941, 2,374; for three-year fish in 1938 it was 1,148, in 1939, 1,190, in 1940, 1,971, and in 1941, 2,332. The average weight per fish (speckled trout) as at November first this year compared with the average weight last year at the same date as follows: yearlings 1940 10 ounces; 1941, 10½ ounces; 2-year-old fish 1940, 14½ ounces; 1941, 21 ounces; 3-year-old fish 1940, 16½ ounces, 1941, 31 ounces; selected fingerlings 1940, 1.04 ounces, 1941, 1.28 ounces.

There was no serious outbreak of diseases among the fry and fingerlings during the year. Frequent baths were given in a solution of copper sulphate, acetic acid and salt. When the fingerlings reached the No. 1 stage the strength of the copper sulphate in the solution used was 1:2000, as the fish grew older the strength was gradually increased to 2:2000 and finally 3:2000. It was found that such a strong concentration offered a greater control of fin-rot than the weaker solution. Extreme care however had to be observed in using a solution of this strength and the fish being treated had to be in a strong and vigorous condition and were fasted at least four hours before being treated. The Atlantic salmon were remedied by means of the constant flow syphon using a copper sulphate solution as a control for external parasites, fungus and as a general conditioner.

Repairs were made throughout the year where needed, troughs, trays and equipment painted and varnished, dwelling floors and lawns improved and extra supports built under troughs in the auxiliary hatchery.

BEDFORD HATCHERY AND SACKVILLE RIVER SALMON-RETAINING POND

George Heatley, Superintendent

On March 25 a shipment of 1,900,000 speckled trout eyed eggs was received from Antigonish hatchery. In November 256,000 Atlantic salmon eggs were secured from Sackville and 1,555,800 from River Philip ponds, 21,500 speckled trout eggs from Cobequid and 2,026,100 from Antigonish hatcheries. Outgoing shipments during the year consisted of 1,000,000 Atlantic salmon eyed eggs to Antigonish in March and April, 300,000 Atlantic salmon No. 1 fingerlings to Mersey June 10-14, 500,000 of the same species and stage of development to Grand Lake rearing station between June 23 and July 15, and 311,100 speckled trout advanced fry to Coldbrook between May 29 and June 7. Distributions direct from Bedford for the year were: 60,900 Atlantic salmon and 17,700 speckled trout fingerlings.

An experimental constant temperature egg hatching box with thermostatic temperature control for a small quantity of water was set up in November by Dr. S. A. Beatty of the Fisheries Experimental Station, Halifax. The object of the experiment is to develop a method of holding eggs for short periods in case of water shortage and to ascertain if it would be of any advantage in the way of better feeding and smaller fry loss to advance the hatch so that the fish would be larger when the usual rise in water temperature occurs.

An experimental adjustable grading device to automatically separate fingerlings of different sizes in troughs was constructed. While it is quite promising it is to be tested further next season.

The distribution from the Grand Lake rearing ponds with the exception of the sebago salmon that were liberated in Grand Lake was practically all made by the Bedford staff, and some assistance was also given by the Bedford establishment in the distributions from Coldbrook rearing ponds. A considerable quantity of gaspereaux for fish food was taken in the Sackville River by the hatchery staff during the migration of this species in the spring and placed in cold storage in Halifax for use later in the season. During the year some new hatching troughs and foot tanks were built to replace old equipment beyond repair, the hatching room and office murescoed and painted, the garage and garage floor raised 18 inches with a concrete wall on the east side and 4-inch terra cotta tile drain laid from the valve pit of the water supply to the river to provide better drainage.

At the Sackville River pond this season between August 23 and October 28, 90 Atlantic salmon were taken, from which 60 females were stripped on November 4 yielding 256,000 eggs for Bedford hatchery. The average weight of the salmon was 6 pounds as against 5.4 in 1940 and 4 in 1939.

COBEQUID HATCHERY AND RIVER PHILIP SALMON-RETAINING POND

J. W. Heatley and P. B. Stratton, Superintendents

Superintendent J. W. Heatley in May was transferred to Margaree hatchery and assistant P. B. Stratton was promoted to Superintendent of the Cobequid establishment.

Between November 6 and 17 some 1,414,500 Atlantic salmon eggs were secured from fish impounded in the River Philip pond, and from October 21 to December 5, 2,751,300 speckled trout eggs were collected from hatchery pond stock. In March and April 1,600,000 Atlantic salmon eyed eggs were shipped to the Grand Falls hatchery, and in November 21,500 speckled trout eggs were transferred to Bedford hatchery. Distributions for the year consisted of 1,061,800 Atlantic salmon and 277,700 speckled trout, including 24,439 salmon fingerlings marked by the removal of the adipose and right ventral fins. In selective

breeding the eggs from forty-four pairs of selected three-year-old and eighteen pairs of selected yearling speckled trout were segregated. Atlantic salmon fingerlings were held during the year in outside rearing tanks and circular ponds. In comparison, those in the ponds attained a size of approximately double those in the tanks, and their propensity for food was also particularly marked. Some repairs, alterations and general improvements to the equipment, buildings and grounds were carried out during the year, such as the construction of a new tank to catch the brine from the cold storage, the making of thirteen V-type pond shades and the erection of a single loop lawn fence along the hatchery frontage.

Repairs at the River Philip salmon pond commenced on August 12 and consisted of the construction of an 82-foot crib along the face of the old dam, the extension of the old fishway wall and minor repairs to the canal wall, pontoons and cabins. Assistant I. A. Mowat of the Charlo hatchery was in charge of operations from October 6. Between October 5 and November 8 some 1,246 salmon averaging 15 pounds in weight were captured, of which 770 females yielded from November 5 to 17 over 5,804,500 eggs. These were allotted as follows: 1,414,500 to Cobeguid, 1,555,800 to Bedford, 1,011,100 to Lindloff, 1,003,500 to Middleton, and 819,600 to Yarmouth. Twelve of the salmon taken bore numbered metal tags showing that they had been marked at this pond in previous years; most of them were returns from the 1939 marking.

COLDBROOK REARING PONDS

E. Barrett, Superintendent

Between May 29 and June 7 some 311,100 speckled trout advanced fry were received from Bedford and on July 9 and 10 forty thousand nine hundred rainbow trout fingerlings from Middleton hatchery. The distributions for the season were successfully made with the assistance of the Middleton and Bedford trucks. Valuable assistance was also given by the Fishery Inspector for the district. The general output amounted to 120,500 speckled and 37,000 rainbow trout. Some loss was experienced in the speckled trout up to the end of the first week in July. Treatments of potassium permanganate were given with the constant flow syphon, and formaldehyde and salt baths were tried. The rainbow progressed satisfactorily throughout the retaining period. Minor painting was carried out, the ponds relined with gravel and disinfected.

GRAND LAKE REARING PONDS

J. M. Butler, Superintendent

Bedford hatchery supplied the Grand Lake rearing ponds with 500,000 Atlantic salmon fingerlings between June 23 and July 15, and in the fall Antigonish transferred thereto 40,000 speckled trout fingerlings. Sebago salmon held in the rearing ponds produced 56,000 eggs as compared with 16,500 in 1940 and 8,000 in 1939. Wild sebago from Rawdon River and Waverley run yielded 41,000 eggs. The distribution, with the exception of the sebago salmon which were liberated in Grand Lake, was practically all made with the assistance of the Bedford staff and consisted of 402,000 Atlantic salmon, 5,300 speckled trout and 38,200 sebago salmon—11,000 of the Atlantic salmon were supplied the Fisheries Research Board of Canada for Moser River. Practically all of the sebagos distributed were marked by the clipping of their adipose and right ventral fins. Seventy-six or 38.4 per cent of the sebago taken for their eggs bore the Grand Lake mark.

During the year necessary repairs were made to the trap equipment, four experimental feeding troughs complete with head tank and hinged shades were constructed, the ponds repaired with clay and gravel, and the grounds improved.

DEPARTMENT OF FISHERIES

KEJIMKUJIK REARING PONDS

T. K. Lydon, Officer-in-Charge

Three hundred thousand Atlantic salmon advanced fry were received from the Yarmouth hatchery between May 26 and 31, and 100,000 speckled trout fingerlings from the same establishment on June 4 and 5. The output for the season amounted to 230,400 Atlantic salmon and 62,400 speckled trout. Treatments of salt and formalin were given as needed. The latter in the strength of 1-4000 administered for an hour to salmon in the circular ponds cleared up without harmful effects any fungus that appeared on the fish. During the year some improvements were made to grounds and a large box was built for catching brine from the freezer.

Good salmon fishing was available in the Medway River and large catches of speckled trout were reported taken from Kejimkujik Lake this season.

LINDLOFF HATCHERY

Wm. T. Owens, Superintendent

A record collection of speckled trout eggs amounting to 2,372,900, being over four times the number taken last year, was made from the brood stock developed at this hatchery; McRae Lake produced 137,800 eggs of the same species and Mill Lake 16,900. These collections were supplemented by receipt of 1,600,000 speckled trout eyed eggs from the Antigonish hatchery on February 18, and 1,011,100 Atlantic salmon eggs from River Philip pond on November 12. Distributions for the season were, 838,800 Atlantic salmon and 1,470,300 speckled trout of which the following speckled trout were marked by the removal of the adipose and left pectoral fins—6,494 yearlings and 637 two years old. In selective breeding, the eggs from thirty-five pairs of selected two-year speckled trout were segregated and the progeny will be further selected to further improve the brood stock. These fish were chosen for high egg yield, early spawning and general appearance.

Some clearing and grading was carried out during the year on a proposed new pond site, all hatchery troughs and tanks were varnished and painted, the interior of the hatchery building repainted, a three-inch hose and valve installed at the hatchery flume for filling the distributing tanks and barrels, and the grounds improved generally.

Speckled trout angling in the Lindloff area was reported as exceptionally good this season. The Fishery Inspector at Arichat co-operated in a very generous manner in assisting with distributions in his district and by furnishing information on the recapture of marked fish and on general fishing conditions. Mr. David McArel of Glace Bay also kindly assisted in securing scale samples from Atlantic salmon taken in Loch Lomond during the season.

MARGAREE HATCHERY

W. D. Turnbull and J. W. Heatley, Superintendents

On May 19 Superintendent W. D. Turnbull was transferred to Antigonish and Superintendent J. W. Heatley from Cobequid took charge of the Margaree hatchery.

Some 3,040,700 speckled trout eggs were collected from hatchery brood stock from October 20 to December 23, and in addition, 3,372,800 Atlantic salmon eggs were received from Margaree salmon pond in November and December. Distributions for the season were: 1,739,200 Atlantic salmon and 2,272,900 speckled trout, including 2,510 speckled trout, one to five years, marked by the removal of the adipose and right pectoral fins.

In selective breeding, the eggs from 16 pairs of selected three-year-old speckled trout were segregated. These averaged 2,344 eggs per female as against 1,661 in the general group. Some 10,000 fingerling trout also were held over for further selection.

During the season losses were normal with no serious outbreaks of disease among the fish. Preventive treatments were carried out by using copper sulphate, acetic acid, salt, potassium permanganate and formalin. As a general disinfectant and prophylactic formalin proved to be the most effective, and as a remedy for *Cyclochaeta* potassium permanganate was found very satisfactory.

During the summer the old sluice conveying water from the brook to the fingerling ponds collapsed and was replaced by a wood stave pipe laid about one foot lower than the former sluice thus obtaining a greater volume of water. A screen of pickets was built around the upper end of the pipe to keep out debris. Other repairs and constructions consisted of ten thirteen-foot hatching troughs to replace five 25-foot old ones beyond repair, the installation of an office to the left of the door at the front of the hatchery, the building of two single flue chimneys—one at each end of the hatchery—to replace the double one in the middle of the hatchery, the re-roofing of the watchman's cabin at the ponds, staining and painting the dwelling and filling and regrading a part of the grounds.

A gratifying increase in the number of salmon taken in the Margaree River was observed this year. Trout fishing in the district held up fairly well with a reported improvement in fishing conditions in the New Boston area between Sydney and Louisburg. The Fishery Inspector and Officers of the district co-operated in every way.

MARGAREE SALMON-RETAINING POND

J. P. Chiasson, Superintendent

In accordance with the usual practice, the salmon for the Margaree Salmon-retaining pond were purchased from the Margaree Harbour Salmon Fisheries Association.

As water conditions were good and reasonable numbers of salmon were reported to have ascended into the pools, the Association's net was set on September 22—some nine days earlier than the preceding year. It was fished continuously and 435 were taken from September 23 to November 11. Thirty-nine of this total, one-half of the number taken daily during the first six days were tagged and liberated above the Association's trap and 396 were impounded.

The recapture of four of these tagged salmon was reported, one in the net, and three by anglers up the river in Plaster, Brook and McDaniel pools. The lapse of time and distance travelled by each fish from the time it was tagged until recaptured was:

Tag No.	Tagged and liberated	Date caught	Where caught	No. days lapsed	Distance travelled
K3272	Sept. 24	Oct. 8	Plaster pool.....	14	10½ miles
K3293	Sept. 27	Oct. 13	Brook pool.....	16	12 miles
K3294	Sept. 27	Oct. 6	McDaniel pool.....	9	6 miles

The pond salmon averaged 11 pounds in weight, and at stripping time, November 14 to December 9, some 306 females yielded 3,372,800 eggs, all of which were laid down in the Margaree hatchery. Only one salmon was lost during the retaining period of some two and a half months which is evidence of the careful manner in which the fish were handled and operations conducted. The pipeline to bring water to the hardening and washing tanks was renewed and plugs inserted at low points to drain off the water at the end of the season.

MERSEY RIVER REARING PONDS

C. E. Harding, Officer-in-Charge

Between June 10 and 14 three hundred thousand Atlantic salmon fingerlings were received from Bedford hatchery and on July 4 two thousand speckled trout from Yarmouth. Both species made good growth during the season and in September 251,700 Atlantic salmon and 1,700 speckled trout were distributed in tributaries of the Mersey River below No. 3 Hydro Development. Valuable assistance was given by the Fishery Inspector and Wardens of the district, the Nova Scotia Power Commission, the Mersey Folk Lodge and others interested in the successful operation of the ponds. During the year three feeding troughs were installed and the grounds and living quarters improved.

MIDDLETON HATCHERY, STEVENS PONDS AND NICTAUX REARING STATION

F. M. Millett, Superintendent

Shipments of eggs received at Middleton were: Eyed eggs, 2,100,000 speckled trout from Antigonish on February 13, 100,000 salmon trout from Glenora hatchery, Ontario (an exchange for speckled trout eggs), on March 12; 19,400 rainbow trout from Yarmouth on May 12, and 32,000 of the latter species from Saint John on May 26. Green eggs, 1,003,500 Atlantic salmon from River Philip pond on November 9 and 14, and 1,802,300 speckled trout from Antigonish on November 17 and 20. Outgoing shipments were: 928,500 Atlantic salmon fry to Nictaux on April 14, and 40,900 rainbow trout fingerlings to Coldbrook on July 9 and 10. Distributions for the season were: 294,100 Atlantic salmon, 67,500 salmon trout and 342,200 speckled trout fingerlings, also 100 speckled trout yearlings which were captured from the hatchery brooks and liberated in Zwicker Lake, Annapolis County. Marked fish included in the distributions amounted to 1,200 speckled trout from which the adipose and left ventral fins had been removed.

During the year necessary repairs were made to the dam and plant, and the garage reshingled. The Fish, Forest and Game Associations were much interested in the waters being stocked from this hatchery and the Fishery Inspectors gave valuable assistance in liberating the output. Trout fishing in the lakes in this district was reported good, and salmon fishing in the Nictaux River exceptionally good—being much better than it has been for some years.

The Nictaux rearing station was opened on April 13 and the next day received 928,500 Atlantic salmon fry from Middleton. Between June 12 and 16, 350,000 were transferred to Stevens ponds. The distributions from Nictaux amounting to 247,400 were made between June 21 and July 9. The Avon River power company again co-operated by screening the head of its power canal during the smolt run and as there was a good flow of water over the dam it is felt that the smolt had no difficulty in making their descent this year.

YARMOUTH HATCHERY

H. V. Gates and F. F. Annis, Superintendents

Following Superintendent H. V. Gates' retirement Superintendent F. F. Annis took charge of Yarmouth hatchery on February 1.

Production and receipt of eggs during the year were: From the hatchery ponds, 160,400 speckled trout between October 30 and November 20 and 60,200 rainbow trout March 28 to April 21; from Miramichi hatchery 700,000 Atlantic salmon eyed eggs March 21, from Antigonish hatchery 3,333,100 speckled trout eggs (1,325,000 eyed March 12 and 2,008,100 green November 16-20), and from River Philip pond 819,600 Atlantic salmon green eggs November 13. Outgoing shipments to other establishments were: 30,300 rainbow trout eyed eggs

to Antigonish May 6 and 19,400 of the same species and stage of development to Middleton May 12, 300,000 Atlantic salmon advanced fry and 100,000 speckled trout fingerlings to Kejimikujik in late May and early June, and 2,000 speckled trout fingerlings to Mersey July 4. Distributions were: 223,700 Atlantic salmon, 515,700 speckled trout and 223 rainbow trout, including 1,357 speckled trout yearlings marked by the removal of the adipose and right ventral fins.

With a view to improving the stock 5,000 speckled trout fingerlings were retained for development and further selection.

Conditions at Yarmouth were better this season as regards high water temperatures, and losses as a whole were considerably less than usual. Both salmon and trout fingerlings made good growth, and specimens of the latter picked at random weighed .64 ounces on December 6.

During the year twenty-seven pond shades of the lattice type were completed. Necessary repairs were made to the hatching room, office and living quarters, feed-room and ponds, two old circular ponds were filled and the grounds improved generally. The Fishery Inspectors of the district were very willing and co-operative when called upon in connection with distributions. A representative series of the fish at the hatchery were shown at the guides' meet at Lake William, N.S., in August in conjunction with the joint booth of the Fish and Game Protective Association and the Provincial Department of Lands and Forests.

CHARLO HATCHERY

R. O. Barrett, Superintendent

In the early part of the year 210,000 speckled trout eyed eggs were received from Antigonish hatchery and in the fall 2,166,400 Atlantic salmon eggs from New Mills salmon retaining pond. Distributions for the season amounted to 1,773,700 Atlantic salmon and 112,500 speckled trout including 10,476 Atlantic salmon marked by the removal of the adipose and right pectoral fins.

During the year the dwelling was given a coat of oil stain, 16 circular ponds reconditioned with sand and clay, and the grounds improved by the planting of a three hundred-foot spruce hedge, shade trees, flowers and shrubs. The largest run of Atlantic salmon in the history of the rivers in the district was reported.

FLORENCEVILLE HATCHERY

George Sutherland, Superintendent

Between September 29 and December 9 the hatchery ponds produced 2,057,100 speckled trout eggs. On February 13 one million four hundred thousand Atlantic salmon eyed eggs were received from Kelly's Pond hatchery and in the fall the following eggs, 1,000,000 Atlantic salmon from Miramichi hatchery and 28,300 sebago salmon from Clinch brook. Distributions of output for the year were: 1,244,900 Atlantic salmon, 1,000 sebago salmon and 1,590,800 speckled trout, of which 10,373 speckled trout, 2 to 6 years old, were marked by the removal of the adipose and left pectoral fins.

In selective breeding the eggs from ten selected pairs from each of the age groups of speckled trout from 2 to 6 years were segregated.

During the year sixteen pond covers were built, the inside woodwork of the main hatchery painted, the troughs in both hatcheries varnished and painted and gyproc ceilings put on the kitchen and living room of the dwelling.

GRAND FALLS HATCHERY

W. A. McCluskey, Superintendent

This establishment received the following eggs: In March and April 1,600,000 Atlantic salmon from Cobequid and 800,000 speckled trout from

Antigonish hatchery; in the autumn 1,239,200 Atlantic salmon from New Mills, 500,000 from Miramichi salmon pond and 470,200 speckled trout from Fraser's pond, Three Brooks. Distributions for the season were: Atlantic salmon 1,490,500 and speckled trout 1,055,300.

Covers of the lattice type were constructed for the wood ponds and minor repairs were made to buildings, ponds and supply well. The Grand Falls, Madawaska, St. Leonard and Ste. Anne Fish and Game Clubs gave valuable assistance in helping to distribute allotments of trout and salmon fry and fingerlings.

MIRAMICHI SALMON-RETAINING POND AND HATCHERY

Frank Burgess, Superintendent

As usual the parent salmon for Miramichi pond this season were purchased by tender and contract, and between September 9 and 15 one thousand six hundred and fifty-six averaging 8.3 pounds in weight were impounded. Some 1,143 females were stripped from October 17 to November 10 and yielded 8,424,800 eggs which were allotted to the following hatcheries: 1,000,000 to Florenceville, 500,000 to Grand Falls, and 6,924,800 to Miramichi.

On March 14, to supplement the quota on hand at the hatchery, 500,000 speckled trout eyed eggs were received from Antigonish, and on October 31 and November 13 some 106,700 eggs of the same species were secured from Tweedie's Meadow brook. Outgoing shipments of Atlantic salmon eyed eggs were: 50,000 to United States Department of the Interior, Fish and Wildlife Service, Washington, D.C., on March 5, and 700,000 to Yarmouth hatchery on March 19. Distributions for the season consisted of Atlantic salmon 3,154,900 and speckled trout 221,900.

During the year, trays, troughs and equipment were varnished or painted and grounds further improved by filling in swamp land.

NEW MILLS SALMON-RETAINING POND

William White, Superintendent

Between May 21 and June 30 five hundred salmon of the early run, purchased from the commercial fishermen of the district, were delivered and impounded at New Mills pond. They averaged 17 pounds in weight, and at stripping time, October 19 to November 13, some 278 females yielded 2,074,400 eggs, all of which were laid down in Charlo hatchery.

A further collection of 334 late run salmon was made between September 4 and October 17 from a trap-net operated at Jacquet River. Their average weight was 8 pounds, and 219 females from October 20 to November 13 yielded 1,331,200 eggs, which were laid down as follows: 92,000 in the Charlo and 1,239,200 in the Grand Falls hatchery.

A new 16 H.P. Acadia engine was installed in the pond launch and the small boat at the pond repaired. A salmon with tag number K2651 attached to its dorsal fin was taken at Jacquet River. This fish had been tagged, stripped and liberated from New Mills pond in 1939, and after a lapse of nearly two years it showed an increase of $10\frac{1}{2}$ pounds in weight and $9\frac{1}{2}$ inches in length.

ST. JOHN HATCHERY AND CHAMCOOK LAKES EGG-COLLECTING STATION

P. B. Stratton, Hatchery Assistant

K. G. Shillington, Superintendent

In May, Assistant P. B. Stratton, who was temporarily in charge at Saint John, was promoted to the position of Superintendent of Cobequid and Superintendent K. G. Shillington transferred from Antigonish to the Saint John hatchery.

A record collection of speckled trout eggs for this hatchery amounting to 3,145,100, being nearly twice the number taken the preceding year, was made between October 18 and December 22 from the hatchery ponds. The ponds also produced 131,200 rainbow trout eggs between April 25 and May 6. In June 3,500 speckled trout yearlings, and in February 650,000 eyed eggs of the same species were received from Antigonish hatchery. In the autumn 134,000 sebago salmon eggs were secured from Chamcook Lakes and 290,900 speckled trout from Spears brook. On February 27, nearly 506,000 speckled trout eyed eggs were shipped to Magog hatchery, and in May 30,000 rainbow trout eyed eggs were sent to Antigonish and 32,000 to Middleton. Distributions for the season were: Atlantic salmon 753,000, rainbow trout 15,400, and speckled trout 1,123,600, including 2,396 speckled trout fingerlings and older fish marked by the removal of the adipose and either the left pectoral or ventral fins. One hundred and fifty-two of the marked fingerlings along with an equal number of unmarked fish and an additional five hundred for Moose Pasture pond were supplied the Atlantic Biological Station at St. Andrews, New Brunswick. Some 1,560 fingerlings were planted in Gibson Lake under the Charlotte County Lakes Management plan, and 684 two, three and four years old were liberated in Lily and No. 1 Artificial Lakes, Rockwood Park, Saint John.

In selective breeding, the eggs from fourteen pairs of selected three-year and twelve pairs of selected two-year speckled trout were segregated. The average egg yield per female in the two- and three-year brood stock showed a marked increase this season. The two-year trout averaged 1,402 as against 585 in 1940, and the three-year 1,756 as against 812 in 1940.

In eighteen of the small ponds, walls, gates and new concrete bottoms were completed. Concrete bottoms were also laid in twenty long ponds with minor repairs made to gates and walls. All branches of the New Brunswick Fish and Game Protective Association within the Saint John hatchery distribution area gave much appreciated assistance with distributions in their respective districts.

Trapping operations at Chamcook Lakes were carried out by Assistant J. G. Annis of the Middleton hatchery, and between October 18 and November 13 one hundred and forty-one sebago salmon, consisting of 69 males and 72 females averaging $3\frac{1}{2}$ pounds in weight, were secured. Stripping operations were carried out by Supervisors F. A. Tingley and A. P. Hills and Assistant J. G. Annis. Between November 7 and 19, 134,000 ova were collected and laid down in the Saint John hatchery. Forty-one of the 141 fish handled in 1941 or 29.1 per cent were hatchery-marked fish.

CARDIGAN REARING PONDS

C. A. Tait, Acting Superintendent

Preparatory work in connection with the ponds was commenced on May 5 to have them in readiness for 50,000 Atlantic salmon, 150,000 rainbow trout and 829,700 speckled trout advanced fry which were received between May 12 and 22 from the Kelly's pond hatchery. The output for the season was 44,800 Atlantic salmon, 143,000 rainbow and 313,700 speckled trout, including 8,000 speckled trout fingerlings marked by removal of the adipose and left pectoral fins.

Assistant C. H. Cooper, who was in charge of the ponds up to May 26, was transferred to the Saint John hatchery and replaced by Assistant C. Sayer on loan from Cobequid hatchery.

Stumps and dead trees around or showing above the surface of the supply pond were cut off or uprooted.

KELLY'S POND HATCHERY AND MORELL RIVER SALMON-RETAINING POND

C. A. Tait, Superintendent

Local collections of eggs this season were—speckled trout, 71,800 from hatchery pond and 161,100 from Andrews and York (Watts' stream) ponds; and 662,000 Atlantic salmon from Morell salmon pond. Transfers from February to May were—1,400,000 speckled trout eyed eggs from Antigonish, 424,000 rainbow trout eyed eggs from the American Fish Culture Company, Carolina, Rhode Island (present), 1,400,000 Atlantic salmon eyed eggs to Florenceville and 50,000 Atlantic salmon, 150,000 rainbow trout and 829,700 speckled trout advanced fry to Cardigan rearing ponds. Distributions for the year were—Atlantic salmon 481,100, rainbow trout 147,500, and speckled trout 447,100.

During the summer a combined ice-house, garage, fuel and storeroom was built, the old ice-house removed, and the grounds generally improved by grading and seeding.

At Morell salmon pond, Assistants R. MacDonald and C. Sayer in succession were in charge. Between October 17 and November 19, some 286 salmon averaging 10 pounds in weight were caught in the pound net. All the fish, however, were not available for stripping as some 132 escaped through a hole in the net during the heavy freshet in November. Due to the escapement the collection this year was small as compared with preceding years. However, 662,000 eggs secured from 82 females from November 6 to 28 were taken and laid down in Kelly's pond hatchery.

REPORT OF THE DEPUTY MINISTER

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Species	Collection area	First and last eggs	Number collected	Disposal—Establishment at	Number	Totals
Atlantic salmon	Margaree pond, N.S.	Nov. 14-Dec. 9	3,372,825	Margaree	3,372,825	
	River Philip, N.S.	Nov. 5-17	5,804,544	Cobequid Bedford Lindloff Middleton Yarmouth Bedford Florenceville Grand Falls Miramichi Charlo Charlo Grand Falls Kelly's pond Yarmouth St. John Grand Lake Grand Lake St. John Florenceville Anderson Lake	1,414,546 1,555,798 1,011,120 1,003,460 819,620 256,000 1,000,000 500,000 6,924,827 2,074,439 1,239,257 662,000 60,199 131,186 41,000 56,000 134,000 28,350 1,043,000	21,925,851
Rainbow trout	Morell River, P.E.I.	Nov. 6-28	662,000	Grand Falls	662,000	
Sebago salmon	Yarmouth hatchery ponds, N.S.	Mar. 28-April 21	60,199	Kelly's pond	60,199	
	St. John hatchery ponds, N.B.	April 25-May 6	131,186	Yarmouth	131,186	191,385
Sockeye salmon	Grand Lake, N.S.	Nov. 8-Dec. 2	41,000	St. John	41,000	
	Grand Lake rearing ponds, N.S.	Nov. 14	56,000	Grand Lake	56,000	
Speckled trout	Chamcook Lakes, N.B.	Nov. 7-19	134,000	Grand Lake	134,000	
	Clinch brook, York County, N.B.	Oct. 26-Nov. 7	28,350	St. John	28,350	259,350
	Anderson Lake, B.C.	Oct. 23-25	1,043,000	Florenceville	1,043,000	1,043,000
	Antigonish hatchery ponds, N.S.	Oct. 13-Nov. 19	24,493,140 (a) 2,677,500	Anderson Lake		
	Cobequid hatchery ponds, N.S.	Oct. 21-Dec. 5	2,507,054 (a) 244,249	Antigonish Bedford Middleton Yarmouth	21,334,200 2,026,100 1,802,270 2,008,070	
	Lindloff hatchery ponds, N.S.	Oct. 9-Nov. 26	1,153,746 (a) 1,219,170	Cobequid Bedford	2,729,799 21,504	
	McRae Lake, Richmond County, N.S.	Oct. 3-11	137,788	Lindloff	2,372,916	
	Mill Lake, Richmond County, N.S.	Oct. 16	16,947	Lindloff	137,788	
	Margaree hatchery ponds, N.S.	Oct. 20-Dec. 23	2,308,857 (a) 738,850	Lindloff	16,947	
	Yarmouth hatchery ponds, N.S.	Oct. 30-Nov. 20	35,940 (a) 124,454	Margaree	3,040,707	
	Florenceville hatchery ponds, N.B.	Sept. 29-Dec. 9	1,905,632 (a) 151,466	Yarmouth	160,394	
	St. John hatchery ponds, N.B.	Oct. 18-Dec. 22	1,904,780 (a) 1,240,342	Florenceville	2,057,098	
	Spear's brook, Charlotte County, N.B.	Oct. 11-Nov. 19	290,950	St. John	3,145,122	
	Tweddie's Meadow brook, Kent County, N.B.	Oct. 31-Nov. 13	106,715 (b)	St. John	290,950	
	Southport (Kelly's pond) hatchery pond, P.E.I.	Nov. 11-Dec. 19	71,820	Miramichi Kelly's pond	106,715 71,820	41,322,400
						64,741,986

(a) Eggs from yearling fish.

(b) Sea run variety.

Speckled trout eyed eggs were purchased, 350,000 from the Donald Fraser Estate, Plaster Rock, N.B., for Grand Falls hatchery, and 152,500 from Harold Watts, York, P.E.I., for Kelly's Pond hatchery.

The Ontario Department of Game and Fisheries through their Glenora hatchery supplied the Middleton hatchery, N.S., on March 12 with 100,000 salmon trout eggs and they received in exchange from the Antigonish hatchery, N.S., on February 18, 150,000 speckled trout eggs. The Quebec Department of Lands and Forests, Game and Fisheries, on February 27, was sent 506,000 speckled trout eggs for their Magog establishment from the Saint John hatchery, N.B., and the United States Department of the Interior, Fish and Wild Life Service, Washington, D.C., 50,000 Atlantic salmon eggs on March 5 for their Craig Brook Fisheries Station at East Orland, Me. The American Fish Culture Company, Carolina, R.I., donated on March 18, 424,000 rainbow trout eggs for the Southport hatchery, P.E.I.

Summary of eggs received: Collections, 64,741,986; purchases, 502,500; donation, 424,000—total 65,668,486.

In the interest of economy and convenience in distribution the following transfers were made in 1941:—

Species	Stage	From	To	Number	Date received
Atlantic salmon...	(c)	(a) Bedford.....	Antigonish.....	1,000,000	Mach. 29, April 4
	(e)	(a) Bedford.....	Grand Lake.....	500,025	June 23-July 15
	(e)	(a) Bedford.....	Mersey.....	300,000	June 10-14
	(c)	(a) Cobequid.....	Grand Falls.....	1,600,000	March 25, April 2
	(d)	(a) Middleton.....	Nictaux.....	928,500	April 14
	(e)	(a) Nictaux.....	Middleton.....	356,000	June 12-16
	(d)	(a) Yarmouth.....	Kejimikujik.....	300,000	May 26-31
	(c)	(a) Miramichi.....	Yarmouth.....	700,000	March 21
	(c)	(a) Kelly's Pond.....	Florenceville.....	1,400,000	February 13
	(d)	(a) Kelly's Pond.....	Cardigan.....	50,000	May 22
Rainbow trout....	(e)	(b) Middleton.....	Coldbrook.....	40,900	July 9, 10
	(c)	(b) Yarmouth.....	Antigonish.....	30,295	May 7
	(c)	(b) Yarmouth.....	Middleton.....	19,440	May 12
	(c)	(b) St. John.....	Antigonish.....	30,000	May 25
	(c)	(b) St. John.....	Middleton.....	32,000	May 26
	(d)	(b) Kelly's Pond.....	Cardigan.....	150,000	May 17-20
	(c)	(a) Antigonish.....	Bedford.....	1,900,000	March 25
Speckled trout....	(e)	(a) Antigonish.....	Grand Lake.....	40,004	Sept. 30-Oct. 7
	(c)	(a) Antigonish.....	Lindloff.....	1,600,000	February 18
	(c)	(a) Antigonish.....	Middleton.....	2,100,000	February 13
	(c)	(a) Antigonish.....	Yarmouth.....	1,325,000	March 12
	(c)	(a) Antigonish.....	Charlo.....	210,000	Feb. 19, March 15
	(c)	(a) Antigonish.....	Grand Falls.....	800,000	March 15
	(c)	(a) Antigonish.....	Miramichi.....	500,000	March 14
	(c)	(a) Antigonish.....	St. John.....	650,000	February 28
	(f)	(a) Antigonish.....	St. John.....	3,500	June 10-26
	(e)	(a) Antigonish.....	Kelly's Pond.....	1,400,000	February 25
	(d)	(a) Bedford.....	Coldbrook.....	311,085	May 29-June 7
	(e)	(a) Yarmouth.....	Kejimikujik.....	100,000	June 4, 5
	(e)	(a) Yarmouth.....	Mersey.....	2,000	July 4
	(d)	(a) Kelly's Pond.....	Cardigan.....	829,660	May 12-17

(a) 1940 fall collection.

(b) 1941 collection.

(c) eyed eggs.

(d) fry.

(e) fingerlings.

(f) yearlings.

THE FOLLOWING TABLE SHOWS THE NUMBERS ON HAND OF EGGS, FRY, FINGERLINGS AND OLDER FISH AT THE END OF CALENDAR YEAR 1941

Hatchery	Species	Eggs	Fry and Advanced fry	Fingerlings	1 year	2 years	3 years	4 years	5 years and Older	Total by species	Total by hatchery
Antigonish	Speckled trout.	19,926,530		14,000	9,574	4,938				19,955,042	19,955,042
	Atlantic salmon.	1,664,998								1,664,998	1,664,998
	Speckled trout.	1,811,370								1,811,370	1,811,370
	Atlantic salmon.	1,343,387						9		1,343,396	3,476,368
Cobequid	Speckled trout	2,554,748		353	1,421	5,429	6,092			2,568,053	3,911,446
	Atlantic salmon.			70,034						70,034	
Grand Lake	Sebago salmon			16,087	5,913	581		182	25	103,138	
	Speckled trout.	80,350		39,813						39,813	212,985
Lindloff	Atlantic salmon.	967,529								967,529	
	Speckled trout.	2,254,949		15,109	1,197	184				2,366,439	3,333,968
Margaree.	Atlantic salmon.	3,223,825	95,000							3,223,834	
	Speckled trout.	2,602,495		10,277	3,076	1,441	600			2,617,859	
Middleton	Speckled trout albinos.					45				45	5,841,768
	Atlantic salmon.	885,300								885,300	
Yarmouth	Speckled trout	870,900								870,900	1,756,200
	Atlantic salmon.	779,663					40			779,703	
Charlo.	Speckled trout	1,808,144		7,337	483	31		21		1,816,016	
	Atlantic salmon.	2,107,588		6,155	1,754					2,108,088	2,595,719
Florenceville	Speckled trout	942,455								942,455	
	Sebago salmon	24,757		17,077	922					42,756	
Grand Falls	Speckled trout.	1,959,841		9,191	7,206	4,673	1,657	1,816	977	1,985,361	2,970,572
	Atlantic salmon.	1,675,599								1,675,599	
Miramichi	Speckled trout	453,551								453,551	
	Atlantic salmon.	6,656,227								6,656,227	2,129,150
St. John	Speckled trout.	100,797								100,797	
	Atlantic salmon.				103		6		119	10,950	6,757,024
Kelly's Pond.	Rainbow trout.			10,831						10,831	
	Sebago salmon	132,615		9,061	4,685					146,371	
	Speckled trout.	3,131,694		30,008	4,051	844	443	571		3,167,611	3,325,041
	Atlantic salmon	648,275								648,275	
	Speckled trout.	209,340								209,340	857,615
		58,816,927	95,000	255,843	40,440	18,121	8,856	2,590	1,121	59,238,898	59,238,898

(a) Includes 4 years and older.

DISTRIBUTIONS

KEY TO ABBREVIATIONS

<i>Species</i>	<i>Stage of Development</i>
A Atlantic salmon	a Green eggs
S Speckled trout	b Eyed eggs
R Rainbow trout	c Fry
L Landlocked or Sebago salmon	d Advanced fry
P Sockeye salmon	1 No. 1 fingerlings
G Salmon trout	2 No. 2 fingerlings
	3 No. 3 fingerlings
	4 No. 4 fingerlings
	5 No. 5 fingerlings
	f Yearlings
	g Two years
	h Three years
	k Older fish

Classification

Advanced fry: Fry that are feeding systematically.

Fingerlings:

- No. 1. Feeding from two to eight weeks.
- No. 2. Feeding from eight to fourteen weeks.
- No. 3. Feeding from fourteen to twenty weeks.
- No. 4. Feeding from twenty to twenty-six weeks.
- No. 5. Feeding from twenty-six weeks to one year from date of hatch.

NOVA SCOTIA

ANTIGONISH HATCHERY

Antigonish County—

Beaver Meadow River—100,000 S1, 5,000 S3.
 Big brook-South River—3,000 S3.
 Black River—15,000 Sd, 45,000 S1, 5,000 S2.
 Brierly brook—20,000 S1.
 Copper Lake—37,317 S1, 5,000 S2, 750 Sg.
 Gaspereaux Lake—1,034 Sh.
 Glenroy River—30,000 Sd, 52,000 S1, 5,000 S2, 2,850 S4.
 James River—70,000 A1.
 Maryvale or Malignant brook—20,000 S1.
 McLean or James River Lake—20,000 S1, 600 Sf.
 McMillan Lake—750 Sg.
 Meadow Green River—30,000 Sd, 52,000 S1, 5,000 S2, 3,000 S4.
 Middleton Lake—15,000 S2.
 North Lake—40,000 S1.
 Pinevale Lake—750 Sg.
 Polson brook-South River—40,000 S1, 3,000 S4.
 Rights River—60,000 A1.
 South Lake—40,000 S1.
 South River—39,389 A2.
 South River Lake—75,000 S1, 5,000 S2, 5,000 S4.
 Springfield brook-Glenroy River—15,000 S1.
 West River—80,000 S1, 6,000 S2, 4,000 S3, 5,000 S4, 480 Sf, 865 Sg.

Guysborough County—

Canter Lake—10,000 S1.
 Cole Harbour Lakes—55,000 S1, 8,000 S3.
 Cooe Coffre Lake—30,000 S1.
 Country Harbour River—50,000 A1.
 Cudahy Lake—25,000 S1.

Cutler Lake—20,000 S2.
 Dobson Lake—65,000 S1, 1,300 Sg.
 Donahue Lake—100,000 S1, 800 Sf, 600 Sg.
 Doyle Lake—20,000 S1.
 Ecumsecum River—105,000 S1.
 Eight Island Lake—25,000 S1, 5,000 S2.
 Fitzgerald Lake—20,000 S1.
 Giant Lake—100,000 S1, 5,000 S3.
 Glencove Lake—4,000 S3.
 Goldboro or Goldbrook Lake—25,000 S1.
 Guysborough River—50,000 S1.
 Hazel Hill Lake—60,000 S1, 900 Sg.
 Hydro dam, Havre Bouche brook—70,000 S1.
 Indian Harbour Lake—75,000 S1.
 Jellow Lake—50,000 S1, 600 Sf, 600 Sg.
 Long Lake-Salmon River—8,000 S3.
 McDonald Lake—Guysborough River—10,000 S2.
 McInnis (Joe's) Lake—50,000 S1, 3,000 S4.
 McKeen Lake—20,000 S2.
 McPherson Lake (Port Shoreham)—35,000 S1.
 Morrison Lake—25,000 S1.
 Narrow Lake—30,000 S1.
 Nickerson Lake—20,000 S1.
 Porter's Lake—200 S4.
 Round Lake (North Ogden)—20,000 S1.
 East River St. Mary—100,000 A1, 90,000 A2.
 West River St. Mary—100,000 A1, 54,000 A2.
 Salmon River—60,000 A1, 50,000 S1.
 Seal Harbour Lake—25,000 S1.
 Sherbrook Lake—85,000 S1, 1,275 Sf.
 Smelt Lake—43,780 R1.
 Square Lake-Salmon River—8,000 S3.
 Sullivan Lake—50,000 S1, 3,000 S4.
 Tracadie River—50,000 A1.
 Trout Lake-East River St. Mary—15,000 S2.

ANTIGONISH HATCHERY—concluded

Pictou County—

Barney River—90,000 A1.
 Big brook-East River—35,000 S1, 5,000 S2,
 2,500 S3.
 Blue Mountain dam, French River—20,000
 S1.
 Brora Lake—35,000 S1.
 Calder Lake—30,000 S1, 790 Sf, 100 Sg.
 Campbell Lake-French River—30,000 S1.
 Caribou River—10,000 S1.
 Little Caribou River—10,000 S1.
 Cummings dam, Brown brook—20,000 S1.
 Dewar dam, Barney River—20,000 S1.
 East River—75,000 A1, 30,000 S1, 5,000 S2,
 2,500 S3.
 East River, west branch—15,000 S2, 2,500 S3.

French River—20,000 A1.
 French River branch (French River Settle-
 ment)—30,000 S1.
 Grays dam, East River—10,000 S2.
 Lansdowne Lake—30,000 S1, 2,000 S3.
 Maple brook—25,000 S1, 5,000 S2, 2,500 S3.
 McLellan brook—50,000 S1, 3,000 S3.
 McLellan Lake—30,000 S1.
 McPherson Lake—45,000 S1, 3,000 S3.
 Middle River—20,000 A1.
 Sawmill brook—10,000 S1.
 Sixmile brook—50,000 S1.
 Stewart dam, tributary to Little Harbour—
 45,000 S1, 1,360 Sg.
 Sutherland River—30,000 S1.
 West River—160,000 S1.

BEDFORD HATCHERY

Halifax County—

Lily Lake—17,715 S1.

Sackville River—60,900 A3.

COBEQUID HATCHERY

Colchester County—

Chiganois River—10,000 S1.
 Debert River—40,000 A1, 7,500 S1.
 Economy River—40,000 A1.
 Economy Lake—7,500 S1.
 Folly River—35,000 Ad.
 Folly Lake—20,000 S1.
 French River—5,000 S1.
 Great Village River—25,000 A1.
 Newton Lake—7,500 S1.
 North River, near Truro—35,000 A1.
 Portapique River—40,000 A1.
 Salmon River—30,000 Ad.
 Simpson Lake—15,000 S1.
 Waughs River—10,000 S1.

Cumberland County—

Parrsboro Aboiteau—10,000 S1.
 Poison Lake—5,000 S1.
 Pugwash River—15,000 S1.
 River Philip—35,000 Ad, 201,000 A1, 95,000
 A2, 62,267 A3, 13,553 A4.
 River Philip, east branch—5,730 S1.
 River Philip, west branch—10,000 S1.
 Shinimikas River—20,000 Ad, 20,000 A1.
 Sugarloaf brook—10,000 S1.
 Sutherland Lake—12,000 S1.
 Tidnish River—20,000 A1.
 Tillies brook—10,000 S1.
 Wallace River—35,000 Ad, 20,000 A1, 40,000
 A3, 10,000 S1.
 Wallace River, west branch—10,000 S1.
 Webb Lake—10,000 S1.

Cumberland County—

Apple River—35,000 A1.
 East brook-Maccan River—5,000 S1.
 Isaac Lake—10,000 S1.
 Leak Lake—7,500 S1.
 Little Lake-Newfound Lake—5,000 S1.
 Maccan River—20,000 Ad, 30,000 A1.
 Maccan River, south branch—5,000 S1.
 McAloney Lake—10,000 S1.
 Mountain brook—10,000 S1.
 Newfound Lake—10,000 S1.

Westmorland County—

Big Lake—20,000 A1.
 Calhoun brook-Silver Lake or Morice pond—
 5,000 S1.
 Jenks brook-Tantramar River—5,000 S1.
 North brook-Tantramar River—5,000 S1.
 North River—140,000 A2.
 Robinson brook-Tantramar River—10,000 A1.
 Silver Lake or Morice pond—10,000 S1.

COLDBROOK PONDS

Kings County—

Annapolis River—8,000 S3.
 Aylesford Lake—10,000 S3.
 Burke Lake—10,000 S3.
 Cambridge brook-Cornwallis River—2,000 S3.
 Cornwallis River—6,000 S3.
 Crooked Lake—5,000 S3.
 Gaspereau Lake—12,000 S3.

Lake George—22,000 S3.
 Lake Paul—5,000 S3.
 Lake Torment—10,000 S3.
 Mack Lake—5,000 S3.
 Murphy Lake—15,500 S3.
 Sunken Lake—37,000 R3.
 Trout River—5,027 S3.
 Turbett Lake—5,000 S3.

GRAND LAKE PONDS

Colchester County—

Stewiacke River, south branch—10,000 A3.

Halifax County—

Chezzetcook River—10,000 A3, 4,000 Af.
 Drain Lake—200 Sg.
 Eagle Lake-Partridge Run—500 Sg.

Five Island Lake—500 Sg.
 Grand (Shubenacadie) Lake—31,250 Lf, 6,705
 Lg, 280 Lk.
 Hatchet Lake—400 Sg.
 Ingram River—5,000 A3, 5,000 A4, 4,000 Af.
 Lochaber flowage-Sheet Harbour—600 Sg.
 Long or Bennery Lake—400 Sg.

GRAND LAKE PONDS—*concluded**Halifax County—*

Moose River—Headwater of Ship Harbour
River—10,000 A3, 10,000 A4, 5,000 Af.
Moser River—11,000 A2.
Musquodoboit River—10,000 A3, 20,000 A4,
10,000 Af.
Ninemile River—12,800 A3, 4,000 Af.
Upper Petpeswick, Long Bridge or Bridge
End Lake—500 Sg.
Quoddy River—10,000 A4, 5,000 Af.
Ragged Lake—Prospect Run—400 Sg.
Rawdon River—10,000 A3, 10,000 A4, 5,000
Af.
Rocky Lake (Waverley)—5,180 Af.
Russel Lake—500 Sg.
Sackville River—10,000 A3, 10,000 A4, 5,000
Af.
Salmon River (Port Dufferin)—10,000 A3,
10,000 A4, 4,000 Af.

Salmon River—Echo Lake—20,000 A3, 4,000
Af.
Little Salmon River (Cole Harbour)—10,000
A3, 4,000 Af.
Spider Lake—300 Sg.
Tangier River—20,000 A4, 5,000 Af.
West River Sheet Harbour—10,000 A3, 10,000
A4, 5,000 Af.
William or First Lake—90 Sg.

Hants County—

Cameron Lake—400 Sg.
Kennetcook River—20,000 A3, 5,000 Af.

Lunenburg County—

East River—5,000 A3, 5,000 A4, 4,000 Af.
Gold River—20,000 A3, 5,000 Af.
Middle River—20,000 A3, 5,000 Af.
Spondo Lake—500 Sg.

KEJIMKUJIK PONDS

Kejimkujik Lake—15,600 S2.
Fairy Lake—6,500 S2.
Grafton brook—5,223 S2.
Little River—13,000 S2.

Maitland River—6,500 S2.
Mount Tom brook—3,900 S2.
Westward or West River—11,700 S2.
Medway River and tributaries—230,394 A3.

LINDLOFF HATCHERY

Cape Breton County—

Canoe Lake—25,000 S1, 10,000 S2.
Chain or String Lakes—Mira River—25,000
S1, 10,000 S2.
Cochran Lake—25,000 S1, 11,000 S2.
Dutch Brook Lake—30,000 S2.
Gaspereaux River—50,000 A1, 45,000 A2.
Gillies Lake (East Bay)—25,000 S1, 15,000
S2.
Hardy Lake—25,000 S1, 10,000 S2.
Kelvin Lake—27,000 S1, 11,000 S2.
Loon Lake (Mira bay)—25,000 S1, 11,000 S2.
McCormick Lake—25,000 S1, 10,000 S2.
Meadow brook—Sydney River—70,000 S1.
Otter Lake—7,000 S1.
Salmon River—50,000 A1, 135,000 A2, 80,000
A3.

Richmond County—

Black River—60,000 S1.
Breen Lake—60,000 S1.
Buchanan Lake—60,000 S1.
Chain Lakes (Madame Island)—30,000 S1.
Ferguson brook—18,000 S1.
Ferguson Lake—55,000 S1.
Forest Lake (Madame Island)—644 Sf.

Grand Lake (Madame Island)—15,000 S1,
75,000 S2.
Grand River—100,000 A1, 18,847 A3.
Kytes Lake—30,000 S1, 778 S3.
Lake Abova—25,000 S1.
Loch Lomond—100,000 A1, 220,000 A2, 40,000
A3.
MacLeod brook—30,000 S1.
Mary Ann's Lake—15,000 S1.
McIsaac Lake—30,000 S1, 9,892 S2, 900 Sf.
McKenzie Lake—25,000 S1, 15,000 S2.
McNab Lake—60,000 S1.
Mill Lake—East River Tillard—4,500 Sf.
Potties Lake (Madame Island)—15,000 S1,
20,000 S2, 450 Sf.
Saint Esprit Lake—25,000 S1.
Seaview Lake—80,000 S1.
Scott brook—60,000 S1.
Shaw Lake (Madame Island)—12,000 S1,
45,455 S2, 637 Sg.
Stratton brook—30,000 S1.
River Tillard, East—30,000 S1.
River Tillard, West—90,000 S1.
Thompson Lake—15,000 S1.
River Tom—30,000 S1.

MARGAREE HATCHERY

Cape Breton County—

Belle Lake—10,000 S4.
Black brook—Mira River—10,000 S3.
Browns Lake—Indian Bay—10,000 S3.
Catalogne Lake—20,000 S3.
Ferguson Lake (New Boston)—5,000 S3.
Forester Lake—10,000 S3.
Giovonetti Lake—10,000 S4.
Grand Lake—Indian bay—20,000 S3.
Grand Lake, near Louisburg—10,000 S4.
Jackson or Johnson Lake—10,000 S4.
Keefe Lake—10,000 S3.

Lily pond—10,000 S4.
McDonald pond—10,000 S4.
McDonald or Widow Lake (New Boston)—
5,000 S3.
McInnes Lake—10,000 S4.
McIntyre Lake (New Boston)—10,000 S4.
McMillan Lake—10,000 S5.
McPherson Lake (New Boston)—9,000 S5.
Scotch or Scott Lake—6,420 S5, 2,499 Sf.
Stewart Lake—10,000 S5.
Trout brook—Mira River—10,000 S3.

MARGAREE HATCHERY—concluded

Inverness County—

Big Brook—River Denys—50,000 S1.
 Captain John's brook—10,000 S1.
 Cheticamp River—200,000 A1.
 Farm brook—30,000 S1.
 Flat Brook—5,000 S2.
 Galant River—70,000 S1, 10,000 S5.
 Gillis brook—30,000 S1.
 Glenbrook—River Denys—30,000 S2.
 Glenora brook—5,000 S3.
 Graham River—10,000 S1.
 Grand Etang brook—30,000 S2.
 Horton Lake—20,000 S3.
 Little Judique River—10,000 S1.
 Mabou River, northeast—49,000 S1.
 Mabou River, southwest—60,000 S1.
 Margaree River, northeast and tributaries—
 650,000 A1, 235,000 A2, 14,160 A3.
 Big brook—70,000 S1, 5,000 S4.
 Egypt brook—50,000 Sd, 25,000 S5.
 Forest Glen brook—43,430 Sd, 30,000 S4.
 Ingram brook—1,332 Sf.
 Lake O'Law brook—25,000 Sd, 30,000 S2,
 15,000 S4.
 Lake O'Law—30,000 S4.
 Fortune brook—35,000 Sd.
 McKinnon brook—35,000 Sd.
 Lake O'Law, upper—15,000 S3, 5,000 S5.
 Levis brook—70,000 Sd, 5,000 S5.
 McDonald brook—40,000 S1.
 McLeod brook—35,000 S1.
 Murphy brook—60,000 S1.
 Murray brook—30,000 S1.
 Watson brook—40,000 S1.
 Margaree River, southwest—100,000 A1.
 Captain Allan's brook—60,000 S1.
 McDonnell brook—60,000 S1.
 Matheson Glen brook—60,000 S1.

McColl brook—20,000 S3.
 McPherson brook—River Denys—30,000 S2.
 Mull river—50,000 A1.
 Pembroke Lake—20,000 S3.
 Plaster ponds—332 Sg, 846 Sk.
 Plateau brook—60,000 S1.
 Skye brook—30,000 S1.
 Strathlorne brook—40,000 S1.

Victoria County—

Aspy River, north—30,000 A2.
 Aspy River, middle—30,000 A2.
 Baddeck Bay brook—30,000 S1.
 Baddeck River—100,000 A1.
 Farquar Angus or McDonald brook—
 30,000 S2.
 Gillis brook—60,000 S1.
 Peter brook—60,000 S1.
 Barasois brook—30,000 S2.
 Big Harbour brook—10,000 S2.
 Dalem Lake (Boularderie Island)—15,000 S3.
 Giffin Lake—7,500 S3.
 Ingonish River—30,000 A2.
 McKinnon Harbour brook—Bras d'Or Lake—
 10,000 S2.
 McNeil brook—Bras d'Or Lake—10,000 S2.
 McPhies brook—Bras d'Or Lake—10,000 S2.
 Morrison Lake—7,500 S3.
 Middle River—100,000 A1.
 Beaver brook—50,000 S1.
 Black brook—40,000 S1.
 Cold brook—20,000 S1.
 Indian brook—70,000 S1.
 McDonald brook—35,000 S1.
 North River—200,000 A1.
 Church brook—20,000 S2.
 Tarbot Lake—15,000 S2.
 Washabuck River—30,000 S2.

MERSEY RIVER PONDS

Mersey River and tributaries—251,700 A3. Upper Great brook—1,697 S3.

MIDDLETON HATCHERY

Annapolis County—

Annapolis River—30,000 A3.
 Barnes Lake—4,000 S3.
 Boot Lake—8,000 S2.
 Crisp brook—7,000 S2.
 Elliott Lake—10,000 S2.
 Fishers Lake—7,000 S2.
 Lake LaRose—5,000 S3.
 Lake Pleasant—10,000 S2.
 Little River—Annapolis River—8,000 S2.
 McGill Lake—15,000 S2.
 Morton brook—5,000 S3.
 Mulgrave Lake—400 S3.
 Nictaux River—195,000 A3, 5,000 S3.
 Paradise Lake—10,000 S2.
 Sand Lake—6,000 S3.
 Sandy Bottom Lake—10,000 S3.
 Shannon River—6,000 S3.
 Slocomb brook—5,000 S2.
 Thirty Lake—10,000 S3.
 Trout Lake—12,000 S3.
 Walker brook—6,000 S2.
 Waterloo Lake—10,000 S2.
 Wiswell brook—4,000 S2.
 Zwicker Lake—6,000 S3, 100 Sf.

Digby County—

Mallette Lake—3,000 S3.
 Porter or Mistake Lake—4,825 S3.
 Round Lake—1,000 S3.

Hants County—

Cameron Lake—8,000 S2.
 Lakeland Lake—7,000 S2.
 Lebreau brook—6,000 S3.
 Maple brook—6,000 S3.
 Mockingigh Lake—10,000 S2.
 Murphy Lake—5,000 S2.
 Zwicker Lake—5,000 S3.

Kings County—

Gaspereau River—9,100 A2.

Lunenburg County—

Canoe Lake, north—10,000 S3.
 Holbert Lake—10,000 S2.
 Indian Lake—Gold River—8,000 S3.
 Lahave River—20,000 A3.
 Lake William—6,000 S3.
 Lewis Lake—7,000 S3.
 Maligeak or Malaga Lake—15,000 S2.
 Middle River—20,000 A3.

MIDDLETON HATCHERY—concluded

Lunenburg County—concluded

New Germany Lake—10,000 S1.
 Ninevah Lake—4,000 S3.
 Oakland Lake—5,000 S3.
 Pernette Lake—6,000 S3.
 Petite River—20,000 A3.
 Sherbrooke Lake—50,000 G1, 17,550 G2.

Spectacle Lake—Maligeak Lake—6,000 S3.
 Whetstone Lake—10,000 S2.

Queens County—

Harmony brook—8,000 S2.
 Medway River—7,000 S2.
 Redwater Lake—5,000 S3.

NICTAUX FALLS REARING STATION

Annapolis County—

Annapolis River—17,400 A1.
 Butler brook-Nictaux River—30,000 A1.
 Fales River—30,000 A1.
 Lequille River—30,000 A1.

Hants County—

Avon River, south branch—25,000 A1.

Lunenburg County—

Gold River—55,000 A1.
 Lahave River—60,000 A1.

YARMOUTH HATCHERY

Digby County—

Babine Meadows—34,374 S1.
 Belliveau River—36,660 Sd.
 Carleton River—8,350 S2.
 Dean brook—38,374 S1, 11 Sk.
 Grosses Coques River—34,374 S1.
 Joe-a-re Lake—215 Sf.
 Meteghan River—107,258 S1.
 Salmon River—42,180 A1, 42,850 A2, 45,136 A3, 6,000 A4, 30,000 S2.
 Salmon-river Lake—10,000 S2.
 Seven Pence Ha'Penny River—2,100 S5.
 Wentworth Lake—25,000 S2.

Jordan River—1,500 S5.
 Lake George—2,191 S5.
 Roseway River—15,000 S3.
 Tigney River—1,500 S5.

Yarmouth County—

Argyle River—15,000 S2.
 Burrell brook—10,000 S2.
 Carleton River—22,900 S1, 15,000 S2.
 Crawley Lake—400 Sf.
 Ellenwood Lake—10,000 S2.
 Jesse Lake—112 Rk.
 Kegeshook Lake—2,000 S5.
 Mink Lake—195 Sf.
 Moulson Lake—2,020 S4.
 Reynard bridge—Tusket River—5,000 S2.
 Rodney Lake—342 Sf.
 Ryerson brook—10,000 S2.
 Salmon River, Gardner brook—1,551 Sf.
 Sloan Lake—400 Sf.
 Stillwater brook (Pubnico Harbour)—1,120 S3.
 Sunday Lake—2,020 S4.
 Tusket River—34,322 S2.
 East Branch Tusket River—30,000 S2.
 Welches brook (Pubnico Harbour)—1,120 S3.

Lunenburg County—

Lake William—12 Rh, 124 S3, 30 Sf, 15 Sg.

Queens County—

Medway River—2,492 Af.
 First Tupper Lake—111 Rk.

Shelburne County—

Barrington River—6,612 A3, 2,000 S3.
 Big brook—3,200 S3.
 Clyde River—24,605 A1, 30,000 A3, 23,824 A4.

NEW BRUNSWICK

CHARLO HATCHERY

Belledune River—10,000 S3.
 Charlo River, north branch—20,000 S3.
 Christopher brook—15,000 S3.
 Black brook—2,500 S3.
 Eel River—15,000 S3.
 Jacquet River—45,000 A1, 52,000 A2.
 Lamontagne Lake—20,000 Sc.
 Loch Lomond—4,000 Sc.
 Louison creek—5,000 S3.
 Louison brook—10,000 Sc.
 Middle River—45,000 A1.

Nash creek—5,000 S3.
 Nipisiguit River—135,000 A1, 64,000 A2.
 Restigouche River—74,000 A1, 502,434 A2.
 Kedgwick River—121,000 A2.
 Little Main River—192,000 A2.
 Matapedia River—117,000 A1, 204,000 A2.
 Upsalquitch River—23,310 A1, 139,000 A2, 60,000 A3.
 Walker brook—4,000 S3.
 Salmon Lake, Matapedia County, P.Q.—2,000 S1.

FLORENCEVILLE HATCHERY

Carleton County—

Becaguimec River—70,000 A1, 54,000 A2.
 Bubby brook-St. John River—8,000 S1.
 Bulls creek-St. John River—54,375 S1, 676 Sk.
 Bull creek-Eel River—65,850 S1.
 Burntland brook-Becaguimec River—16,312 S1.
 Burpee brook-Presquile River—25,000 S1.
 Colton brook-Shikatahawk River—10,000 S1.

Day brook-Becaguimec River—21,750 S1.
 Debec brook-St. John River—32,262 S1.
 Gallivan brook-St. John River—8,600 S1, 200 Sk.
 Gin brook-Becaguimec River—10,875 S1.
 Guisiguit River—65,250 S1, 324 Sk.
 Little Guisiguit River—65,250 S1, 324 Sk.
 Hagerman brook-St. John River—21,750 S1, 285 Sk.

FLORENCEVILLE HATCHERY—concluded

Carleton County—concluded

Hardwood brook-St. John River—10,000 S1,
125 Sk.

Second Howard brook-Becaguimec River—
10,875 S1.

Lanes creek-St. John River—5,000 S1.

Lily brook-St. John River—21,750 S1.

Mallory brook-St. John River—25,000 S1.

Maynes brook-Little Presquile River—27,287
S1.

McLeary brook-Lakeville pond—27,287 S1,
560 Sk.

Meduxnekeag River—70,000 A1, 54,000 A2.

Miramichi River, southwest and tributaries—
75,000 A1, 217,000 A2.

Monquart River—25,000 A2.

Presquile River—50,000 A1, 25,000 A2.

Little Presquile River—36,890 A2.

River de Chute—54,375 S1, 522 Sk.

Shiktahawk River—20,000 A2.

Little Shiktahawk River—25,000 A2.

Tweedie brook-St. John River—3,000 S1.

York County—

Brown Lake—20,000 S1, 350 Sh.

Clinch brook-Little Magaguadavic Lake—500
Lf.

Cranberry Lake—602 Sk.

Cross creek-Nashwaak River—97,875 S1, 720
Sh.

Davidson Lake—87,000 S1, 652 Sh.

Dunbar brook-Nashwaak River—16,312 S1.

Second Eel Lake—81,562 S1, 360 Sk.

Keswick River—50,000 A1, 25,000 A2.

Kingsley brook-Nashwaakis River—16,312 S1.

Limekiln brook-Nashwaak River—31,377 S1,
360 Sh.

Longs creek-St. John River—30,000 S1.

Mactaquac River—45,000 A1, 25,000 A2.

Manzer Mill stream-Nashwaak River—16,312
S1, 400 Sg.

McBean brook-Nashwaak River—21,750 S1.

McCallums brook-Nashwaak River—20,000 S1.

McIntosh brook—St. John River—10,000 S1.

Middle brook-Nashwaak River—35,000 S1,
360 Sh.

Nackawic River—50,000 A1, 27,000 A2.

Nackawic River, northeast—400 Sg.

Nashwaak River—60,000 A1, 112,000 A2.

Nashwaakis River—135,937 S1, 378 Sk.

Pidgeon brook-Nashwaak River—15,000 S1.

Pokiok River—70,000 S1, 504 Sh.

Risteen Lake—35,000 S1.

Rusagonis River—50,000 S1, 400 Sg, 216 Sh.

Shogomoc River—97,875 S1, 900 Sg.

Skiff Lake—129,000 A2, 500 Lf.

Taffa Lake—48,937 S1.

Tay River—43,500 S1, 355 Sh.

Tinkettle brook-Nashwaak River—10,875 S1,
400 Sg.

GRAND FALLS HATCHERY

Victoria County—

Saint John River and tributaries—225,000 Ad,
588,300 A1, 3,667 A3.

Boutout brook—5,000 S1.

Hatchery brook, below falls—10,000 Sc,
4,732 S3.

Hatchery brook, above falls—4,000 S1.

Little River—195,000 Sc, 45,000 S1.

Headwaters—15,000 S3.

Ryan brook—20,000 Sc, 15,000 S1, 20,000
S3.

Salmon River and tributaries—100,000 Ac,
282,800 A1, 76,000 A2, 45,000 A3.

Foley brook—20,000 S3.

Little Salmon River—26,500 A1.

Mooney brook—10,000 S1.

Outlet brook—5,000 S1.

Sutherland brook—50,000 Sc.

Tobique River and tributaries—25,000 Ad,
43,200 A1, 60,000 A2, 15,000 A3.

Pokiok brook—50,000 S1.

Trout brook—5,570 S3.

Madawaska County—

Baker brook—13,000 S2.

Baker Lake—40,000 S2, 20,000 S3.

Caron Lake—135,000 S1.

Grand River—50,000 S1, 10,000 S3.

Big Forks—10,000 S3.

Black brook—5,000 S3.

McCoil brook—5,000 S3.

Green River—38,000 S3.

Lynch brook—2,000 S3.

Iroquois River—15,000 S2, 30,000 S3.

Ledges pond—10,000 S2.

Nine Mile brook—5,000 S1.

Quisibis River—50,000 S1, 15,000 S3.

Siegas River—50,000 S1.

Trout brook—28,000 S2.

Unique Lake—50,000 S2.

MIRAMICHI HATCHERY

Bartibog River—20,000 Sd, 37,500 S1.

Black River—17,500 Sd, 48,000 S1.

Middle River—20,800 A1, 20,800 A2.

Miramichi River, northwest and tributaries
—1,087,500 Ad, 187,562 A2.

Miramichi River, southwest and tributaries
—330,000 Ad, 464,200 A1, 104,000 A2.

Miramichi River, little southwest—429,000
Ad, 291,000 A1.

Napan River—10,000 Sd, 10,000 S1.

North River-Petitcodiac River—108,000 A2.

Pokemouche River—20,000 S1.

Pokemouche River, south branch—10,000 S1.

Tabusintac River—28,000 Ad, 45,000 A1,
18,200 A2.

Eskedellie River—17,500 Sd.

Tetagouche River—20,800 A1.

Little Tracadie River—7,500 S1.

Tweedie's Meadow brook—20,000 Sd, 3,900
S1.

SAINT JOHN HATCHERY

Atlantic Biological Station, St. Andrews, New Brunswick—500 S1, 304 S5.

Albert County—

Little or Coverdale River—15,000 S1, 750 S2.
McFadden Lake—5,000 S1.
Mill creek—2,500 S3.
North River-Shepody River—7,690 R2.
Pollett River—15,000 S1, 1,000 S2, 6,000 S3.
Prosser brook-Little River—15,000 S1.
Turtle creek—15,000 S1, 500 S2, 2,500 S3.
Turtle creek, east branch—2,500 S3.
Weldon brook-Petitcodiac River—2,500 S3.
West River-Shepody River—7,690 R2, 15,000 S1, 1,000 S2.

Charlotte County—

Bartlett brook—4,000 S1.
Bartlett Lake—1,000 S3.
Berry brook-Waweig River—250 S2.
Bog brook-Digdeguash River—1,000 S2.
Bonny River—500 S2.
Burns brook-Digdeguash River—4,000 S1.
Campbells brook-Digdeguash River—750 S2.
Clarence brook-Magaguadavic River—15,000 S1.
Cox brook-Magaguadavic River—750 S3.
Craig brook-Digdeguash River—8,000 S1.
Deadwater brook-Magaguadavic River—750 S3.
Digdeguash River—25,000 S1, 2,500 S2.
Digdeguash River, N.W. branch—1,000 S2, 1,500 S3.
Digdeguash Lake—2,000 S2, 2,000 S3.
Disappointment or Mistake Lake—20,000 Sd.
Douglas Lake—500 S3.
Falls brook-Digdeguash River—1,000 S2.
Gallop stream (Oak bay)—500 S3.
Gibson Lake—1,560 S5.
Little Goad brook-Canoose River—250 S3.
Goad brook-Canoose River—500 S3.
Goat brook-St. Croix River—8,000 S1.
Green brown brook-Canoose River—8,000 S1, 500 S3.
Haddock Lake—500 S3.
Hubble brook-South Oromocto River—4,000 S1.
Jones brook-Digdeguash River—250 S2.
Lilly Lake—1,000 S3.
Lintons Meadow brook-Magaguadavic River—20,000 Ad.
Long Lake-Waweig Inlet—1,000 S3.
Magaguadavic River—70,000 Ad, 80,000 A1.
Magaguadavic River, at Flume ridge—250 S3.
McCarlies brook-Waweig River—8,000 S1, 500 S2.
McDougall Lake—16,000 S1, 3,000 S3.
McGuire's brook-Waweig River—500 S2.
Meadow brook (Oak bay)—500 S2.
Mohannas creek—1,250 S3.
Murchie brook-Denny stream—8,000 S1, 500 S3.
New River—12,000 S1.
Oromocto Lake, south—2,250 S2.
Piskahagan River—85,000 A1.
Red Rock Lake—12,000 S1.
Rigley brook-Digdeguash River—250 S2.
Robinson Cold brook and tributaries flowing into stillwater joining West Long and Victoria Lakes—3,750 S2.

Roix Lake—10,000 S1.
Sam Halls brook-Digdeguash River—500 S2.
Sandy brook-Canoose River—250 S3.
Scoullar or Schoolar brook-South Oromocto River—4,000 S1.
Snipe brook-Mohannas creek—250 S3.
Soap brook-Mohannas creek—250 S3.
Sparks Lake—3,000 S3.
Stein Lake—10,000 S1.
Twin Lake—1,500 S3.
Utopia Lake—44,000 S1.
Welch Lake—6,000 S2.
Wren Lake—500 S3.

Kent County—

Buctouche River—1,000 S3.
Canaan River—1,000 S3.
Cocagne River—1,000 S3.

Kings County—

Anderson brook-Big Salmon River—1,250 S2.
Cedar camp stream-Trout creek—8,000 S1, 2,000 S2.
Chestnut brook-Smith creek—750 S2.
Chisholm Lake—1,000 S2.
Crawford Lake—4,000 S1.
Dee brook-Smith creek—4,000 S1, 500 S2.
Drury brook-Kennebecasis River—2,500 S2, 750 S3.
Hammond River—16,000 Sd, 4,000 S2.
Hammond River, headwater—3,000 S3.
Holmes brook-Sharp brook—750 S2.
Jack Lake—5,000 S1.
Jolliff or Jolly brook-Pascobac creek—250 S2.
Kennebec brook-Studholm brook or Millstream—1,750 S3.
Kennebecasis River—120,000 Ad, 46,353 A1, 10,000 S1, 750 S2.
Kennebecasis River, headwaters—8,000 S1, 6,000 S3.
Kennebecasis River, south branch—23,000 S1, 750 S2.
Kirk brook-Trout creek—2,500 S2.
Little Salmon River—15,000 Ad.
McAfee brook-Studholm brook or Millstream—750 S3.
McGregor creek-Smith creek—8,000 S1.
McLeod brook-Penobsquis River—750 S3.
Mechanics Lake-Trout creek—6,000 S3.
Moosehorn brook and tributary (Finn Campbell brook)—1,750 S3.
Moss Glen Lake—5,000 S3.
Nigger brook-South branch Kennebecasis River—1,500 S3.
O'Neil brook—500 S2.
Parlee brook-Trout creek—4,000 S2.
Pickett Lake—15,000 S1.
Portage brook-Kennebecasis River—2,000 S3.
Prices brook—11,000 S1, 1,000 S2.
Sally brook-Smith creek—4,000 S1.
Seacord brook-Trout creek—750 S3.
Sharp brook-Studholm brook or Millstream—500 S2.
Smith creek-Kennebecasis River—12,000 S1.
Studholm brook or Millstream—12,000 S1.
Tait brook-Raredon Lake—1,250 S2.
Trout creek-Kennebecasis River—20,000 Ad, 20,000 A1, 2,686 A3.
Ward creek, upper-Kennebecasis River—3,000 S3.
Windgap brook-Smith creek—750 S2.

SAINT JOHN HATCHERY—concluded

Queens County—

Canaan River, Forks stream—15,000 S1, 750 S2.
 Lake George or Long Lake—30,000 S1.
 Newcastle creek—15,000 S2.
 O'Neil Lake—5,000 Sd.
 Salmon River—126,000 A1.

Saint John County—

Back dam-St. John River—6,000 S1.
 Beaver brook-Mispek River—40,000 S1.
 Big Salmon River—60,000 Ad.
 Blacks Lake-Moose creek—8,000 S1.
 Black River—4,000 Sd.
 Boaz Lake—4,000 S1, 5,000 S4.
 Brandy brook—5,000 S1.
 Clear Lake—6,500 A1.
 Dolan Lake—11,200 S1.
 Douglas Lake—8,000 S1, 3,000 S4.
 Elderly brook-Little River—4,000 S1.
 Germaine brook—8,000 Sd, 2,000 S2.
 Graham Lake—5,000 S1.
 Grassy Lake-Black River—20,000 S1.
 Hanford brook—8,000 Sd, 2,000 S2.
 Hanson River—8,000 S1.
 Henry Lake—16,000 Sd, 5,000 S2.
 Hopey Lake—10,000 S1.
 Kelly Lake-St. John River—10,000 S1.
 Lake Retreat—20,000 Sd.
 Lands or Quinn Lake—4,000 S1.
 Lily and No. 1 Artificial Lakes—Rockwood Park—5,000 S1, 432 Sg, 193 Sh, 59 Sk.
 Little River—8,000 S1, 18 Sf, 4 Sg, 27 Sh, 92 Sk.
 Little Salmon River, headwater—2,000 S2.
 Loch Lomond—28,000 S1, 7,000 S2.
 Martin Head brook—1,250 S2.
 McCracken Lake—8,000 S1, 10,000 S4.
 Mechanic's Rest pond—4,000 Sd.
 Millican Lake—5,000 S1.
 Mispek River—2,000 S3, 3,000 S4.
 Robinson Lake—1,000 S2.
 Southern Lake, lower—5,000 S1.
 Treadwell Lake—8,000 Sd, 5,000 S4.
 Tynemouth or Ten Mile creek—20,000 Ad, 15,000 A1.
 Wilmot stream-Loch Lomond—12,000 Sd, 3,000 S2.

Sunbury County—

Bailey or Scribner brook-South Oromocto River—1,000 S3.
 Dan's brook-South Oromocto River—3,000 S3.
 Douglas pond-South Oromocto River—4,000 S1.
 Fritz creek-South Oromocto River—4,000 S1.
 Hardwood creek-Northwest Oromocto River—4,000 S1.
 Morency brook-Northwest Oromocto River—4,000 S1.
 Oromocto River—20,000 A1, 2,500 A3.
 Otter brook-Northwest Oromocto River—4,000 S1.
 Peat brook-South Oromocto River—4,000 S1, 1,000 S3.
 Pleasant brook—7,000 S2.
 Shin creek-South Oromocto River—4,000 S1.
 Spring brook-South Oromocto River—2,500 S2.
 Three Tree creek-Oromocto River—4,000 S1, 2,500 S2.

Westmorland County—

Anagance River—8,000 S1, 500 S2.
 Bulmer's pond—4,000 S2.
 Hall creek-Petitcodiac River—4,000 S2.
 Hayward brook-Anagance River—11,000 S1, 500 S2.
 North River—8,000 S1, 1,000 S2, 1,000 S3.
 Petitcodiac River—20,000 Ad.
 Rearing pond, Moncton Fish and Game Protective Association—1,000 S2.
 Scoudouc River—1,000 S2.
 Tait brook-Memramcook River—7,000 S1, 500 S2.

York County—

Big Cranberry or Harvey Lake—20,000 S1.
 George Lake—20,000 S1, 1,500 S2.
 Lyon brook-Northwest Oromocto River—4,000 S1.
 Mink Lake—8,000 S1.
 Mink Lake stream-Magaguadavic River—750 S2.
 Oliver Lake—1,250 S2.
 Spring brook (James Vail)-Magaguadavic River—4,000 A2.
 Yoho brook-Northwest Oromocto River—4,000 S1.

PRINCE EDWARD ISLAND

CARDIGAN PONDS

Kings County—

Bear River—5,000 S3.
 Big brook-Fortune River—8,000 S3.
 Big pond (Hermanville)—6,000 S3.
 Brudenell River—6,000 S3.
 Cardigan River—3,673 S4.
 Creed's pond-Sturgeon River—8,000 S3.
 Finlayson's pond-Greek River—8,000 S3.
 Goose River—5,000 S3.
 Hay River—5,000 S3.
 Jenkin's pond-Greek River—4,000 S3.
 Leard's pond-Morell River—8,000 S3.
 MacLeod's pond-Murray River—6,000 S3.
 McLeod's pond-Midgell River—6,000 S3.

McPherson's pond-Montague River—6,000 S3.
 McRae's pond-Montague River—5,000 S3.
 Montague River (below McRae's pond)—3,000 S3.
 Montague pond (Electric Power)—6,000 S3.
 Mooney's pond-Morell River—5,000 S3.
 Morell River—10,000 A1, 18,000 A2, 16,845 A3.
 Munn's brook-Brudenell River—4,000 S3.
 Naufrage River—6,000 S3.
 Priest pond (Bayfield)—6,000 S3.
 Quigley's pond—6,000 S3.
 Sturgeon River—6,000 S3.
 Webster's pond-Marie River—6,000 S3.

CARDIGAN PONDS—concluded

Prince County—

Barbara Weit River—6,000 S3.
 Cain's stream-Mill River—6,000 S3.
 Clark's pond-Wilmot River—8,000 S3.
 Enmore River—6,000 S3.
 Gard's pond-Mill River—6,000 S3.
 McArthur's pond-Foxley River—4,000 S3.
 Old Wool Mill pond-Tryon River—4,000 S3.
 St. Nicholas pond (Sunbury Cove)—6,000 S3.
 Scales pond-Dunk River—81,000 R3.
 Sheen's pond-Trout River (Tyne Valley)—4,000 S3.
 Sheep River—8,000 S3.
 Tuplin's pond-Indian River—6,000 S3.
 Wright Leard's pond-Dunk River—6,000 S3.

Queens County—

Andrews' pond-Hunter River—4,000 S3.
 Belle River—9,000 S3.

Cook's pond-Newton River—4,000 S3.
 Head of East or Hillsborough River—35,000 R3, 7,000 R4.
 Glenfinnan Lake—10,000 R1.
 Hardy's pond-Winter River—6,000 S3.
 Hope River—7,500 S3.
 Lane's brook-Vernon River—4,000 S3.
 Leard's pond-Pisquid River—6,000 S3.
 McPherson's pond-Flat River—6,000 S3.
 McPherson's pond-Pinette River—6,000 S3.
 Parson's pond-Glynde River—7,500 S3.
 Pisquid or O'Keefe's Lake—10,000 R1.
 Ross' pond-Vernon River—4,000 S3.
 Simpson's pond-Hope River—5,000 S3.
 Southwest River (Margate)—5,000 S3.
 Stevenson's pond (Rustico Harbour)—4,000 S3.
 Watt's stream-Winter River—8,000 S4.
 West River—12,000 S3.
 Winter River—8,000 S3.

KELLY'S POND HATCHERY

Kings County—

Big brook-Fortune River—10,000 S1.
 Crane's pond-Morell River—8,000 S1.
 Dingwell's pond-Fortune River—12,000 S1.
 East or Hillsborough River—5,000 S1.
 Fitzpatrick's pond-Seal River—6,000 S1.
 Graystone creek-Boughton River—8,000 S1.
 Hodgson's stream-Boughton River—5,000 S1.
 Hooper's pond-St. Peter's Lake—6,000 S1.
 Larkin's pond-Naufrage River—10,000 S1.
 Leard's pond-Morell River—12,000 S1.
 MacDonald's pond-Fortune River—5,000 S1.
 McRae's pond-Montague River—10,000 S1.
 Marie River—40,000 A1.
 Midgell River—50,000 A1.
 Montague pond (Electric Power)—10,000 S1.
 Morell River—200,000 Ad, 141,080 A1.
 Narrow creek-Boughton River—5,000 S1.
 Naufrage River—12,000 S1.
 Ross' pond-Boughton River—15,000 S1.
 Head of St. Peter bay, below Quigley's pond—50,000 Ad.
 Warren's pond-Head of East or Hillsborough River—8,000 S1.

Prince County—

Bain creek (Ascension)—5,000 S1.
 Barlow pond-Grand River—5,000 S1.
 Bell's stream-Mill River—8,000 S1.
 Bell's stream (Cape Traverse)—5,000 S2.
 Brae River—5,000 S1.
 Cannon's pond-Smelt River—4,000 S1.
 Carr's stream-Malpeque bay—5,000 S1.
 Croroy's pond (Cape Kildare)—5,000 S1.
 Currie's pond-Little Pierre Jacques River—10,000 S1.
 Fitzgerald's pond-Grand River—4,000 S1.
 Gordon's pond-Kildare River—10,000 S1.

Leard's pond-Trout River tributary to Lot 10 River—5,000 S1.
 McAusland's pond-Mill River—10,000 S1.
 McNally's pond-Jacques River—5,000 S1.
 Marchbank's pond-Trout River (Tyne Valley)—6,000 S1.
 Rix's pond-Kildare River—10,000 S1.
 Round pond (Cape Kildare)—5,000 S1.
 Waddell's pond (Cape Traverse)—5,000 S2.
 Webster's pond (Augustine Cove)—5,000 S2.

Queens County—

Andrews' pond-East River—8,000 S1.
 Bagnall's pond-Hunter River—10,000 S1.
 Black River-Tracadie bay—8,000 S1.
 Black River-Covehead bay—6,000 S1.
 Brander's pond (Seaview)—4,000 S1.
 Callaghan's pond-East River—5,000 S1.
 Clark's stream-East River—15,000 S1.
 Coles' pond-North River—10,000 S1.
 Cousins pond (Seaview)—5,000 S1.
 Craswell's pond-Hunter River—8,000 S1.
 Crooked creek-Wheatley River—5,000 S2.
 Dixon's pond-De Sable River—15,000 S1.
 Found's pond-Stanley River—5,000 S1.
 Gates' pond-North River—5,000 S1.
 Glenfinnan Lake—77,485 R1.
 Holms' pond-De Sable River—5,000 S1.
 Johnston River—10,000 S1.
 Kelly's or Hatchery pond—3,100 S2.
 Leard's pond-Crapaud River—15,000 S1.
 MacCormack's stream (Deroche point)—5,000 S1.
 McAulay's stream-Tracadie bay—6,000 S1.
 McLean Brothers pond-West River—10,000 S1.
 Pisquid or O'Keefe's Lake—70,000 R1.
 Rackham's pond-Wheatley River—12,000 S1.
 Stordy's pond-Crapaud River—8,000 S1.

BRITISH COLUMBIA

ANDERSON LAKE HATCHERY

Hillier creek-Maggie Lake—1,030,296 Pb.

APPENDIX No. 4

ENGINEERING BRANCH

Report by C. BRUCE, M.E.I.C., Chief Engineer

This branch is responsible for all technical works coming within the purview of the department in the Maritime Provinces, British Columbia, and the Northwest Territories, where administration of the Fisheries is under federal government jurisdiction. These include the removal, from streams, of obstructions which impede or prevent the ascent of fish to suitable spawning grounds, the design of fishery facilities for privately owned dams, the installation of which must be made by the owners of such dams in conformity with the requirements of the Fisheries Act, the design and construction of fishways or such other facilities as may be required to enable fish to surmount natural obstructions in rivers, the design and supervision of construction of bait freezers, cold storage plants and other buildings in connection with the fishing industry, and surveys, designs and supervision of construction of fish cultural establishments, including hatcheries, dwellings, water supplies, rearing ponds and other incidental items. The branch is also responsible for the administration of the department's oyster cultural work in the Maritime Provinces.

BUILDING FISHWAYS AND CLEARING RIVERS

Works under this head involve: (a) Surveys and the preparation of designs for adequate fishway facilities either in dams which prevent the ascent of fish to suitable spawning grounds or to overcome natural falls or impassable barriers to their ascent, and (b) the removal of artificial obstructions to their ascent. In many streams accumulations of debris of various kinds resulting from landslides, forest rubbish, or even large trees which have fallen into the water as a result of freshets undermining the banks, as well as materials resulting from logging operations, may so obstruct the open water as to make the upstream progress of fish difficult and actually impossible under certain stages of water. Many such conditions require immediate action to insure that channels shall be open in time to permit the season's run of fish to ascend as otherwise adequate seeding of the spawning areas would be entirely prevented. Through the activity of local inspectors and fishery guardians, logging operators, in general, are giving greater care to the disposal of their slash and waste, when it is likely to menace areas drained by streams frequented by fish, as they have been brought to realize that it is less expensive to arrange from the commencement of operations to keep streams clear of fallen material and culled logs, than to be required to return afterwards and clean up the debris. In spite of this, however, jams and barriers of various kinds will continue to form, and if their removal is not undertaken at an early stage, they may form nuclei for large accumulations, the removal of which might well involve much heavier expenditures.

Discontinuance of fish cultural operations for the propagation of salmon in Pacific coast waters has resulted in attention being focussed on the preservation, improvement and development of natural spawning grounds which are to be found in the great numbers of streams draining the British Columbia coastline. In many instances these streams are difficult of access, but before any improvement of conditions for the ascent of fish past natural barriers in a stream is undertaken, it is explored for some length to determine whether

suitable gravel beds exist of sufficient extent to provide spawning grounds that will give promise of returns commensurate with the cost of contemplated improvements.

Unless obstructions are of a major character, such as to require the advice of an engineer, it is the usual practice to require their removal under the supervision of the local fisheries inspectors after the need has been established.

The works undertaken during the year are classified and reviewed hereunder:—

NOVA SCOTIA

Nictaux River, Annapolis County.—A survey was made of a situation at the Nova Scotia Light and Power Company Limited storage dam on this river, where observations had indicated that salmon were having difficulty in ascending through the gate opening at certain water stages. The difficulty was found to be caused by the presence of several rock ledges just below the gate against which the fish were thrown by the current. The Company undertook the removal of the necessary rock.

Gaspereau River, Kings County.—Reference was made in annual report for 1939-40 to the Nova Scotia Light and Power Company Limited having increased the height of their storage dam at the outlet of Gaspereau lake, thereby necessitating a re-design of the fishway facilities. The new fishway, built by the Company from designs prepared by the Engineering Branch, operated in a completely efficient manner providing a ready means for the ascent of fish.

It was also pointed out that the screen placed by the company in the diversion canal from Gaspereau Lake had not operated efficiently as no effective means had been provided for descending fish to find their way back to the river channel. A by-pass channel to overcome this difficulty was completed early in the season and operated quite efficiently.

Grand River, Richmond County.—A survey was conducted to obtain information for reconditioning an old fishway over Grand River Falls which are some 22 feet high.

North River, St. Anns, Victoria County.—Following a further survey, referred to in the 1940-41 report, it was decided that the provision of a suitable fishway would be necessary to overcome a falls on this river, where salmon are prevented from ascending, except under certain favourable water stages. Work on the fishway, which involves blasting and concrete construction, was commenced, but due to abnormally high water conditions, which prevailed practically throughout the summer, it was not possible to economically continue the work and completion was accordingly deferred. Later reports indicated that the work done had greatly improved conditions for the ascent of fish even though it is not entirely completed.

Examinations and surveys for the improvement of conditions for the ascent of fish were made at the following locations: McPhail's Brook, Graham's Brook, Lake O'Law Brook, Gold River, Petite Riviere, Medway River, Broad River, Tangier River, and Pembroke Lake. In some instances the improvement of conditions for the ascent of fish by removal of obstructions was involved and in others the question of improvement of the fishway facilities was dealt with.

NEW BRUNSWICK

Kouchibouguac River, Kent County.—The hydro-electric development in this river, recently acquired by the New Brunswick Power Commission, under-

went extensive repairs which necessitated the provision of a new fishway. Surveys were conducted and subsequently a design for the fishway was submitted to the commission, which is responsible for the installation.

Tobique River, Victoria County.—Following a survey, designs for a fishway to replace the old one in their dam at Plaster Rock, were submitted to Frasers, Limited. The company proposes to proceed with the work during the season of 1942.

Examinations were made of situations at the following places: Flume Ridge on the Magaguadavic River, River Glade on the Pollet River, Iroquois River and Aroostook River. In some instances the question of the need for providing fishways in existing dams and in others the improvement of conditions were given consideration.

BRITISH COLUMBIA

Bridge River Canyon, Fraser River.—A fishway through rapids in the Fraser at the outlet of Bridge River had become obstructed from the lodgment of large boulders, which it was necessary to remove to permit the ascent of salmon.

Lowe Inlet.—A portion of a rock slide in the bed of the stream draining Simpson Lake into First Lake was removed. This was a total obstruction to the ascent of salmon and it is expected that the work will result in making available considerable additional spawning ground areas.

Silicia Creek.—A large log jam lodged in a canyon, one mile above the outlet of this stream, was removed by contract. The jam was a total obstruction to the ascent of fish.

Stamp Falls Fishway.—Due to the action of water in churning heavy boulders, which had fallen into one of the compartments of this fishway, the division wall was completely broken through. Repairs were effected and in addition new timber control gates were installed.

Improvement of conditions for the ascent of salmon, involving either the partial or entire removal of log jams as required, the removal of forest rubbish, beaver dams and debris was undertaken in the following streams: Alpha Bay stream, Atnarko River stream connecting Holmes and Givenchy Lakes at Captain's Cove, Genesi River, Lewis Harbour stream, Pacofi Creek, unnamed stream at Port Stephen, San Josef River, Sewell Inlet Creek, Thurston Harbour stream and Tinkey River.

In addition to the above-mentioned streams, the patrol men and guardians made many minor improvements in the way of clearing logs and brush from numerous spawning streams along the coast, in the course of their inspections.

FISH CULTURAL ESTABLISHMENTS

No work involving capital expenditure was undertaken, but in addition to the usual maintenance, repairs and replacements were undertaken as reviewed hereunder:

NOVA SCOTIA

Bedford Hatchery.—The garage for the truck was raised 18 inches, with a concrete wall under the east side. The floor was similarly raised with stone filling topped with fine crushed stone. A 4-inch drain was laid from a valve box to provide drainage.

Middleton Hatchery.—Cleavage in the concrete at the top of the water supply dam necessitated the removal of approximately two feet along the crest and reconstruction of the same.

Grand Lake Rearing Ponds.—As some question regarding the correct boundaries had arisen with the former owner of the property acquired for this pond system by the Provincial Government and later transferred to the Federal Government, it was necessary to make a complete survey including the several rights-of-way involved. Plans from this survey were subsequently prepared as a basis of adjustment.

Antigonish Hatchery.—Several plots of land were found to be affected by the flowage from the storage dam operated by the Department at the foot of Loch Katrine to supplement the water supply for Antigonish hatchery. Surveys of these lands were completed and plans and descriptions prepared as a basis for settlement with the owners of the lands in question.

Lindloff Hatchery.—The site for circular ponds, surveys for which were completed in 1940, was laid out and all bushes and trees removed. The use of a grader was obtained from the Provincial Department of Highways to level the site, but due to wet weather very little was accomplished.

Margaree Hatchery.—The sluicè placed some years ago to convey water from the brook to a system of rearing ponds collapsed and was replaced with a wood stave pipe, with the necessary head screens to prevent the entry of debris. As the old double chimney in the centre of the hatchery building had become unsafe, it was taken down and in order to provide better accommodation for heating, two single chimneys were built, one near either end of the building. A small room was partitioned off at one end of the hatchery to provide office accommodation, the previous room for this purpose having been utilized for an electric lighting plant. Several new hatchery troughs were installed.

River Philip Ponds.—The old concrete dam acquired with the property for this establishment has been progressively deteriorating for a number of years until, following more extensive damage from ice in the spring of 1940, it was necessary to make rather extensive repairs. A continuous rock-filled cribwork, 82 feet long, was built to fill in the worst section, and this is now in good condition. It is however anticipated that it will be necessary to similarly repair the remainder of the dam without much delay, as the crest is badly broken away in many places. As the same damage extended to the fishway, which is used for the capture of salmon for spawning purposes, it was necessary to extend the outer wall with concrete to the point where ascending salmon congregate.

Yarmouth Hatchery.—Extensive repairs were carried out to the hatchery where moisture had caused decay along both ends and one side of the building. Considerable work was also done in repairing the concrete rearing ponds where erosion had broken down gate slots.

NEW BRUNSWICK

Saint John Hatchery.—The gate slots and some of the concrete walls having, through time, become badly broken down, it was decided to rebuild the gate openings to a somewhat larger dimension in the rearing pond system comprising eighteen units. At the same time, the walls were repaired and concrete bottoms placed throughout. Concrete bottoms were also placed in twenty long brood ponds and repairs made to the gate openings and walls as needed. In order to provide for extension of the rearing facilities at this hatchery, a

survey of property which would be needed was completed. Plans were subsequently prepared and submitted to the City of Saint John, from which the hatchery property is leased, and it is anticipated that the city will be agreeable to the proposal.

Grand Falls Hatchery.—The concrete well which forms part of the head-works of the hatchery water supply was repaired to overcome leakage which had developed, and considerable repairs were made to floors of the fuel room in the hatchery.

PRINCE EDWARD ISLAND

Kelly's Pond Hatchery.—The old ice house at this establishment having deteriorated beyond repair, it was decided, in rebuilding it, to make it an addition to the coal and storage building, instead of erecting it as a separate small building. The storage building was first moved to a more suitable site and provided with new foundations, after which the icehouse section, which includes a feed-room for handling fish food, was completed.

OYSTER CULTURE

The leasing of ground for oyster farming in Prince Edward Island and Nova Scotia was continued during the year under review.

In Prince Edward Island 119 leases were issued, bringing the total since leasing commenced in 1932 up to 994. For various reasons 360 leases have been cancelled or abandoned by the lessees, leaving a total of 634 in effect, having a combined area of 1,580.68 acres. In addition, 635 applications were before the Department for consideration.

The action on an application for a lease includes investigation of the area it covers in order that the applicant may be advised of the prospects before proceeding. Following approval of the application, the area is surveyed and a proper description prepared for inclusion in the lease. Various factors may cause delay, after an application is received, before the lease is completed. Climatic conditions may be unsuitable for examining the ground or for making the survey, or the applicant may delay in proceeding after being notified of approval of his application. Such delays account, to a large extent, for the relatively large number of incompleted applications.

In Nova Scotia 67 leases were completed, making a total of 204 issued since leasing commenced in 1938. Cancellations and abandonments totalled 19, leaving 185 leases having a combined area of 437.41 acres in effect, while 85 applications were being given consideration.

A total of 130 surveys for new areas and 23 resurveys of old leases were completed during the year in Prince Edward Island, while in Nova Scotia 44 surveys for new leases were undertaken.

Additional survey work included:—

1. A portion of the survey of Conway River, not entirely completed during the year 1940, and the preparation of plans of this inlet.
2. A triangulation and stadia survey of part of Alexandra Bay, to be used in connection with leases.
3. All public picking areas in Malpeque Bay, where the picking of small oyster is permitted, were laid out and marked.
4. Cedar reference posts, marking the location of oyster survey monuments, were placed or renewed throughout the Malpeque, Foxley River, Conway Narrows, Percival River, Enmore River and Bedeque Bay areas.

5. Ranges were established and painted range stakes set, marking the grid lines in Bentinck Cove, Barbara Weit River, Shipyard River and McLaurin's Cove, where large concentrations of leased areas make this desirable to facilitate the ready location of boundaries.

6. A new mud digging area was located and surveyed in Enmore River, and the digging areas in Grand River, Malpeque Bay area, were marked.

7. A triangulation and stadia survey of North and South basins, River Denys, in the Bras d'Or Lakes areas, was completed. This survey entailed a large amount of work due to the irregularities of the shoreline and it was necessary to establish forty-two triangulation stations.

8. The area in Shediac Bay, New Brunswick, reserved from public oyster fishing for natural propagation, was permanently marked with concrete corner blocks, and range beacons were established on Shediac Island for the north, south and east boundaries.

9. The boundary defining the line between areas in Buctouche Harbour, where oyster fishing is permitted during the regular fishing season and where such fishing is permitted only after November 1st, was established and permanently marked with beacon ranges.

GENERAL

The Engineering Branch dealt with all correspondence in connection with the department's oyster cultural work in the Maritime Provinces, as well as that in connection with engineering works both there and in British Columbia.

Mr. John McHugh, who occupied the position of resident engineer in British Columbia, retired on superannuation during the year.

APPENDIX No. 5

**REPORT ON OYSTER CULTURE WORK UNDER THE DEPARTMENT
OF FISHERIES FOR THE YEAR 1941-42**

BY

C. J. KERSWILL AND A. W. H. NEEDLER

Fisheries Research Board of Canada

In the fiscal year 1941-42 oyster culture work was conducted by the Department of Fisheries in Prince Edward Island, Nova Scotia and New Brunswick. The present program of work has been in progress since 1928 in Prince Edward Island and since 1934 in Nova Scotia. In New Brunswick investigations were carried on in 1932 and 1933 in the Shediac area but development was postponed on account of uncertainties regarding public health control. In 1940 work was resumed in the Shediac area and expanded to a limited extent to other parts of the province. This was continued in 1941.

For the aims and general organization of the work in each province reference may be made to the appendices of annual reports of the Department of Fisheries since 1930.

Progress in oyster culture has not yet been affected seriously by the war. Because of the increased value of oysters on the Canadian market, resulting from the embargo on oysters from the United States, there has been even greater interest than formerly in oyster farming in many districts. Interest on the part of new lessees has been maintained and there is a continued demand for leasing of new areas. A number of lessees of long standing whose expenditures have exceeded their profits since the beginning of the work realized substantial profits during the past year. As oyster farming is a long-term activity in which production cannot be expanded quickly and in which work must be done now to produce oysters about five years hence, continued supervision is needed and private effort should not be reduced too drastically.

A.—PRINCE EDWARD ISLAND

In 1941-42 private oyster farming was continued on about the same scale as in 1939-40 and actual expenditure was only slightly lower. It was still limited largely to the Malpeque-Cascumpeque region, work on any considerable scale being carried on elsewhere only in Bedeque Bay. The effects of oyster mortality are still felt in the Charlottetown region and elsewhere but there is a resumption of interest based partly on the prospects for re-establishing the industry by planting Malpeque oysters resistant to the disease. Oyster farming was continued on a very small scale in other outlying areas.

The development of oyster areas under cultivation in Prince Edward Island to 1939 is summarized in a table in the Report on Oyster Culture for 1939-40.

Malpeque-Cascumpeque Region.—This is the region where oyster farming was first established under the present program and where the benefits of experimental farming and other activities of the department have been felt most directly. The industry has, therefore, reached a more advanced stage here than elsewhere.

As shown in Table I, it has just passed through a phase of rapid expansion when large expenditures were made which are expected to result in greatly increased production in the near future. Expenditures were reduced in 1940 and 1941 but operations were continued on a large enough scale for a much greater yield than at present. Production was slightly less in 1941 than in 1940 but the receipts from the sale of oysters were higher owing to higher market prices. The excess of expenditures over receipts has dropped from about \$30,000 in 1938 to the low figure of \$1,116 in 1941, and it may be expected that very shortly the industry will be on a wholly profitable basis. As it takes about five years to produce high-quality oysters by spat collection and rearing, the rapid increase in effort from 1935 to 1938 is expected to lead to increased production in the years following 1940.

Although the possibility of making oyster farming pay in this region has been demonstrated by both the department and the industry, there is still room for improvement. Continued effort is needed to develop the cheapest and best methods possible, to educate oyster farmers in those methods and to adapt administrative policies to the industry's needs. Even in this region where the industry has reached the most advanced stage, its expenditures since 1935 have exceeded its receipts by about \$80,000.

Mortality of Oysters.—The history of the serious mortalities of oysters, which have occurred during the past few years in the Charlottetown region and in Enmore and Percival rivers, and the evidence of the resistance of Malpeque stock have been reviewed in the reports on oyster culture for 1938-39 and 1939-40.

Investigations in 1941 provided further evidence of the resistance of Malpeque stock to the disease. Malpeque oysters have now been held for four years in close proximity to native survivors of the disease in Brackley Bay and Enmore River. Although the natives showed poor survival and growth the Malpeque oysters have suffered no serious mortality either in these experiments or in several other transfers to areas affected by the disease.

At Johnston's River in the Charlottetown area 100 barrels, and at Enmore River 20 barrels, of Malpeque oysters were planted early in 1939 in the hope that they would dominate spat production in these small isolated inlets so that spat, most of which was resistant to the disease, could be collected. The oysters have survived and spat has been collected and held to determine its survival.

The mortality destroyed the results of oyster farming which had been carried on in the north shore bays near Charlottetown up to 1936. It also discouraged any new attempts there or in other areas where the occurrence of the disease was feared. On the other hand it destroyed the public fishery in the tributaries of Hillsborough Bay and in Enmore and Percival Rivers and eventually led to interest in oyster farming as a possible means of re-establishing oyster production in these inlets. This is due largely to the accumulation of evidence that Malpeque oysters are resistant to the disease and can be used to establish oyster farming in the affected areas. It is also due in part to the natural production of small oysters which suggests an imminent natural recovery. The latter may, however, be misleading as experience has shown that a high mortality is to be expected among such oysters before they reach marketable size.

The department allowed those who had already had leases or approved applications in areas affected by the disease to hold them without development work or payment of rentals. With the strong evidence that Malpeque oysters survive in these areas, the department has now again required that lessees and applicants satisfy the ordinary requirements if they are to retain their areas.

The department is also making Malpeque stock available to oyster farmers in the areas affected by the disease. As stated above, it is attempting to estab-

lish sources of resistant spat at Johnston's River and Enmore River. It also offers spat and small oysters for sale from reserves in the Malpeque Bay region. Planting stock is already in such demand there that private sources cannot be relied on to supply outside demands.

Bedeque Bay.—In 1941 about 1,335 barrels of oysters from Summerside harbour were relaid for purification in Salutation, Sedgewick and Sunbury Coves, and about 1,065 barrels were marketed from these coves, as compared with 775 barrels relaid in 1940 and 680 barrels marketed.

Provision of Planting Stock.—The department offers for sale to lessees both spat and small oysters. In so doing it attempts to make them available to as many as possible and to avoid providing any considerable proportion of the planting stock used by those already established who should develop their own resources. In 1941 the demand for small oysters exceeded the supply but 133 barrels were sold. The department also sold 237 gallons of separated spat.

The policy of issuing permits to lessees to pick oysters for stock purposes in the shallow shore zone where winter mortality is high was continued in 1941. This policy has led to the transfer of large quantities of oysters into deeper water thereby saving them from the winter killing which would otherwise have destroyed a large proportion.

B.—NOVA SCOTIA

The two oyster-producing regions of Nova Scotia—the Bras d'Or Lakes and the Gulf of St. Lawrence coast—have conditions and problems widely different from each other and from the north shore bays of Prince Edward Island, where investigations were commenced first. Intensive investigations have, therefore, been necessary to adapt cultural methods to the special local conditions. The two regions are considered separately below.

As the agreement between the Dominion Government and the Government of Nova Scotia was not completed until 1936 the present oyster culture program in the province is at an earlier stage. Development has apparently been retarded to some extent by diversion of effort to war purposes. Actual private oyster farming has as yet commenced on only a very small scale.

BRAS D'OR LAKES

A preliminary survey of the oyster areas of the Bras d'Or Lakes was made in 1934 and some minor supplementary investigations in 1935. Intensive investigations were commenced in 1936 and ground was offered for lease in 1937.

The general prospects for profitable oyster culture in the Bras d'Or Lakes are not very good unless the marketing of the oysters can be permanently improved. The conditions for the production of oysters in this region are now well known and may be summarized as follows: Spat production is excellent but growth is slow and the oysters tend to be fresh in flavour and to have thin meats and soft shells. Production may be cheap in spite of slow growth but the quality of the oysters can satisfy only relatively low-priced markets. Tests in 1940 showed that Bras d'Or Lakes' spat could be separated from the collectors by machine without serious loss in spite of the softer shells of the region.

Marketing Problems.—The most serious problem of the industry is to improve marketing rather than production. When sold in the shell the oysters realize low prices and command only an uncertain market so that production is discouraged. Although an unusually good general demand for oysters improved marketing in this region in 1941 the situation has not improved fundamentally and may be expected to deteriorate as production of high-

quality oysters is increased elsewhere. Since relatively good oysters for sale in the shell cannot be produced in this region, sound improvement can be expected only if other outlets can be developed to provide a more reliable market.

In 1939 the Department of Fisheries and the Nova Scotia Marketing Board co-operated in an attempt to explore the possibility of marketing Bras d'Or Lakes oysters shelled and in bulk. In the trials conducted in 1939—for further details of which see the report on oyster culture for that year—the quality of the product was high enough to compete with oysters imported from the United States but the yield of oyster meat per barrel was low and a return of only \$1.50 per barrel was realized.

The trial was repeated in 1940 on the same basis as in 1939—the department providing equipment and instruction, the Nova Scotia Marketing Board assisting in marketing and a local association of oyster producers providing the oysters and doing the actual work. By reducing the labour cost and improving the marketing a return equivalent to \$2.70 per barrel or almost twice as high as in 1939 was obtained even before the embargo was placed on the importation of shelled oysters from the United States.

A repetition of the experiment in 1941 on the same basis as in the two previous years has provided still more encouraging results. The relatively high price of \$4.90 per barrel was paid the oyster producers; a high rate of pay—60 cents per gallon—was paid the shuckers; a good yield was obtained—409 barrels of oysters produced 480 American gallons of oyster meats; and a return of \$5.24 per gallon was realized. Thus, there are now favourable prospects for the marketing of shucked oysters. It should not be expected, however, that such high prices can exist permanently because they are largely the result of the present embargo on United States importations.

Leasing of Oyster Grounds.—At the end of 1939-40 applications for oyster leases to the number of 165 had been received of which 122 had been examined and approved and 96 surveyed. By the end of 1941-42 the total had reached 192 of which 184 had been approved and surveyed and 148 completed as leases. The policy of leasing only grounds capable of producing relatively good oysters for the region was continued.

Development of Leased Areas.—Private oyster farming in this region in 1941 is summarized in Table II. It shows little change from the previous year. The cash expenditure was increased and slightly more work was done, fewer oysters were planted and the sales of oysters were only slightly higher.

The picking of small oysters in shallow water along the shore was permitted again in 1941 and about 163 barrels were obtained by lessees and planted on their areas.

NORTHUMBERLAND STRAIT

In this region conditions are suitable for the production of higher quality oysters than in the Bras d'Or Lakes and the principal problems concern production rather than marketing. It differs from both the Bras d'Or Lakes and the north coast of Prince Edward Island in its large tides which make tidal flats of great importance both in the natural production and in the potentialities of the region for oyster culture.

A preliminary survey of the region was made in 1936 and intensive investigations were commenced in 1937 and are still in progress centred at Malagash where areas are reserved for experimental farming. They are reported in greater detail in the section below on experimental farming and investigations.

Leasing of Oyster Ground.—In this region no leases are being issued of areas now producing oysters in commercial quantities and some applications

have been refused on this basis. To the end of 1939 over 45 applications had been received of which 34 were approved and 25 surveyed. By the end of 1941 the total had reached 73, of which 62 were approved and 61 surveyed.

Development of Leased Areas.—Private oyster farming in this region in 1941 is summarized in Table II. Its development has been retarded by uncertainty regarding methods suited to the special local conditions, by limited sources of planting stock and by the diversion of effort caused by the war.

Some progress is being made in Caribou harbour and East River and in 1941 a considerable amount of work was done in Merigomish harbour. The relaying of oysters from dangerously polluted parts of Pictou harbour was continued, there being more oysters relaid in 1941 than in previous years.

C.—NEW BRUNSWICK

In New Brunswick the Shediac area alone was transferred to Dominion jurisdiction in 1931. Some work was carried on in 1932 and 1933 but was discontinued owing to the uncertainty of the public health situation. There is a demand for increased work in this province, especially in Kent, Westmorland, Northumberland, and Gloucester Counties.

Public Health Problems.—In 1940 investigations in co-operation with the Department of Pensions and National Health indicated that the bacterial content of oysters in polluted areas is so reduced during the winter that oysters from some of these areas may be safely marketed during the winter. This has relieved the situation to some extent but only part of the polluted areas can be fished through the ice.

Methods of purifying oysters from polluted areas require further study. Investigations which were commenced in 1940 are being continued in 1942 in order to develop the best possible technique for the relaying of polluted oysters in relatively pure water and their recovery for the market.

Development of Oyster Farming.—It is believed that in this region as elsewhere oyster farming can increase the production and improve the quality. Investigations of the potentialities of the region from this point of view were commenced in 1940 and will be continued in 1942. There is local demand for an effort in this direction.

D.—GENERAL

REVENUE

Revenue from oyster culture for the past four years is summarized in Table III. It had increased steadily to 1939 but showed some reduction in 1940 when it amounted to just over \$8,000, due to somewhat reduced sales of oysters from the department's experimental areas in Prince Edward Island. In 1941, partly because of higher market prices, the revenue was the highest that has yet occurred. Although fluctuations will doubtless occur it is expected that the revenue, including rents and royalties, will continue its long-term tendency to increase, although probably not as rapidly as during the past few years.

The revenue from oyster culture cannot be spent on oyster culture but it reduces the net cost of the work to the government considerably below the total expenditure. In 1941-42 the appropriation was \$24,000 but through economy the expenditure was limited to \$20,560 and the revenue reduced the net cost to about \$10,660.

The revenue was largely from Prince Edward Island. Excluding general expenses equally applicable to all provinces and amounting to about \$1,500

the estimated net cost of the work in 1941-42 is about \$800 in New Brunswick, about \$5,500 in Nova Scotia and only about \$3,800 in Prince Edward Island. Thus, although the total volume of necessary work is greater in Prince Edward Island, the greater revenue there reduces the net cost below that in Nova Scotia where the development is at an early stage.

Investigations and Experimental Farming

In 1941 investigations and experiments were continued by the Department of Fisheries in close co-operation with the Fisheries Research Board. These were designed both to determine the potentialities of oyster areas and provide a sound basis for administration and development and to develop and demonstrate the most suitable cultural methods. The department has tested on a commercial scale methods resulting from scientific investigations.

The great development of oyster farming, which has not yet reached a mature stage, makes it important to develop and demonstrate further improvements in methods. Our knowledge must be made to keep pace with the changing needs of the industry which has shown to a high degree the co-operation necessary to make the results of this work successful. It has shown an eagerness to try new methods and oyster farmers have themselves developed improvements in practical technique.

Headquarters for all experimental oyster farming by the department and the board are maintained at Ellerslie where areas have been set aside for that purpose on a tributary of Malpeque Bay and where the board has established the Prince Edward Island Biological Station. The special needs of other localities are, however, borne in mind. Many of the results obtained at this central experimental farm are applicable elsewhere, but investigations, demonstrations or provision of stock are carried out elsewhere to meet special local needs. Thus, in 1941 investigations were continued at Orangedale and Malagash, N.S., where an attack is being made on the special problems of the Bras d'Or Lakes and the Gulf of St. Lawrence coast of Nova Scotia. Further investigations were carried on at Shediac, in the Charlottetown region, and to a lesser extent elsewhere. The extension of intensive work to outlying areas is, however, limited by expenses and availability of trained personnel.

Results of Investigations and Experiments.—These may be found in greater detail in bulletins and circulars of the Fisheries Research Board and only the salient features of the investigations will be given here.

Predictions of the settlement of oyster spat were made in 1941 in the Malpeque-Cascumpeque, Orangedale, Malagash and Shediac regions. Everywhere there was a failure in spat production because of exceptionally unfavourable weather conditions throughout the summer. Provided normal production occurs in 1942 the lack of 1941 stock should not be felt seriously. It will be spread over several years due to variation in the growth rate of oysters during the five years required to reach marketable size.

Further information was obtained on the factors controlling the fatness of oysters. Improvement in condition by transfer down-river and reduction in fatness by transfer up-river was shown. Experiments to determine the best season at which to make transfers were begun but they must be continued if reliable information is to be obtained. The results of these condition studies are expected to be of direct practical value since the relaying of oysters from polluted areas is now a common practice.

Further evidence has been obtained that Malpeque oysters are resistant to the disease that is responsible for serious oyster mortalities in Prince Edward Island. Two attempts to establish the resistant Malpeque strain in areas affected by the disease are showing favourable results. Observations are also being made on the natural recovery of oyster stocks in affected areas.

Experiments were carried out to show the extent of seasonal variation on the rate of feeding of starfish upon oysters and to test further the size of oysters that can be eaten by different sizes of starfish. With lowering water temperatures a marked reduction in the feeding rate was observed as the temperature approached 5°C ., but feeding continued at a slow rate at temperatures just above 0°C . It was in general confirmed that oysters are relatively safe if as long as two-thirds the diameter of the starfish although small oysters can fall prey to starfish whose diameter is only slightly greater than themselves, especially if several starfish attack one oyster.

At Malagash, N.S., investigations were continued on the cultivation of oysters on flats exposed at low tide. High mortalities followed the unusually severe winter of 1940-41 both on unprotected flats and where shallow water was retained by the dyke. An intensive investigation of conditions under the ice and the action of ice on oysters is in progress in the winter of 1941-42. Collection of spat over exposed tidal flats by suspension of collectors from staging was again successful, avoiding both silting and wave action. This method compares favourably in cost with suspension of collectors from floats as practised elsewhere.

Experiments were begun at Malagash towards improved methods of relaying oysters for purification. Re-laying is often accompanied by serious mortalities caused by planting in unfavourable locations and by high labour costs of transfer and recovery for marketing. It appears that oysters may be re-laid satisfactorily on wire netting with attendant reduction of loss, improved conditions and reduced labour costs.

Observations were continued on the life history and activity of the oyster drill, *Urosalpinx cinerea*, which occurs at Malagash and some other places on Northumberland Strait and may be a serious pest. Drills were found to winter on and among oysters and not, as previously supposed, at a lower level. Thus transfer of oysters from infested areas is dangerous at all seasons.

In the Bras d'Or lakes problems of spat production have been largely solved but experiments are in progress to test the efficiency of rearing oysters on brush to reduce expenses. Observations in 1941 on two-year-old spat collected and held on brush indicated that the method is worth while since the oysters had survived and grown well. Experiments on the production and marketing of shelled oyster meats showed that there are much better prospects for this commodity than was suggested by the earlier experiments in the past two years.

Further evidence was obtained for the theory that the frequent failures in spat production in Shediac bay are a result of the removal of oyster larvae from the inlet by tidal currents.

Preliminary examinations of oyster areas in Kent and Westmorland counties of New Brunswick were continued and extended to Northumberland and Gloucester Counties.

In addition to the above and other investigations of less importance in 1941, the exploration of oyster areas has continued in all three provinces as a necessary preliminary to the formulation of administrative policies or to the leasing of oyster grounds.

Grading and Inspection

Important and necessary steps in the improvement of the packing of oysters for marketing have been made during the past two years. In 1940 a survey was made of the grading then carried on and a majority of the packers were interviewed. From the information obtained and from measurements of graded oysters, four grades were defined as regards shape, to be called "Fancy", "Choice", "Standard" and "Substandard". Early in 1941 regulations were passed to ensure that these grade names could be used only on oysters which had been inspected by one of the department's officers and found to conform to the requirements for the grade concerned. Regulations were also passed setting forth requirements with regard to the general packing of oysters, since improvement here was shown to be necessary by the survey in 1940. The fishery officers were instructed in the new requirements and grades to enable them to assist the packers and one inspector checked oyster shipments on arrival at Montreal and interviewed buyers.

A much improved pack of oysters and well-satisfied buyers resulted from this effort. Several further improvements in the grading and packing regulations have been suggested and approved and they will be enforced in 1942.

Public Health

A review of the relationship between the oyster industry and public health may be found in the report on oyster culture for 1939-1940.

In 1941 further examination of oyster areas by the Department of Pensions and National Health resulted in minor changes in the boundaries of areas considered to be dangerously polluted and enabled several producing areas to be re-opened to direct marketing. Details of the present definition of closed areas are given in the fishery regulations.

TABLE I.—OYSTER FARMING IN THE MALPEQUE-CASCUMPEQUE REGION,
1935 TO 1941

	1935	1937	1938	1940	1941	*Total 1935-41
1. Barrels of oysters planted.....	1,303	3,192	5,968	5,337	3,392	28,164
2. Concrete-coated spat collectors used (egg-crate fillers).....	3,350	55,600	98,000	82,500	51,824	376,574
3. Barrels of oysters sold.....	979	1,948	3,451	3,251	3,187	17,133
4. Receipts from sale of oysters (esti- mated at \$9 per bbl. 1941; \$8 pre- viously).....	\$7,832	\$15,584	\$27,608	\$26,008	\$28,683	\$140,251
5. Wages paid by oyster farmers.....	\$2,137	\$11,532	\$17,971	\$12,485	\$11,533	\$79,075
6. Money spent for materials used.....	\$1,665	\$14,305	\$27,484	\$ 8,914	\$10,696	\$ 91,437
7. Total cash expenditure.....	\$3,802	\$25,837	\$45,455	\$21,399	\$22,229	\$170,512
8. Days' work by lessees or unpaid assistants.....	1,126	4,300	7,022	5,085	4,326	\$ 30,495
9. Value of (8) at \$1.75 per day.....	\$1,971	\$ 7,525	\$12,289	\$ 8,899	\$ 7,570	\$ 53,368
10. Total expenditure.....	\$5,773	\$33,362	\$57,744	\$30,298	\$29,799	\$223,880
11. Excess of total expenditure over re- ceipts.....	-\$2,059	\$17,778	\$30,136	\$ 4,290	\$ 1,116	\$ 83,629
12. Excess of cash expenditure over re- ceipts.....	-\$4,030	\$10,253	\$17,847	-\$4,609	-\$6,454	\$ 30,261

* Includes 1936 and 1939 figures, which are not shown in detail.

TABLE II.—DEVELOPMENT OF OYSTER AREAS UNDER CULTIVATION IN NOVA SCOTIA IN 1941

Region	Number of Areas under Cultivation	Approximate Total Area	Oysters Planted	Oysters Sold	Wages Paid for Development	Money Spent for Materials	Days' Work by Lessees	Value of Time by Lessees at \$1.75 per Day	Total Value of Work and Materials
		(acres)	(bbl.)	(bbl.)	\$	\$		\$	\$
Bras d'Or Lakes.....	131	255	163	418	17	482	418	731	1,230
Merigomish Harbour...	21	82	448	261	882	646	780	1,365	2,893
East and West Rivers, Pictou Co.....	5	24	71 ¹	40			53	93	93
Caribou Harbour.....	14	40	238 ²	333		10	53	93	103
Tatamagouche Bay.....	10	31	12	42	24	65	116	203	292
Wallace Bay.....	5	11	3		21	2	5	9	32
Total, Northumberland Strait.....	55	188	772	676	927	723	1,007	1,763	3,413
Grand Total.....	186	443	935	1,094	944	1,205	1,425	2,494	4,643

NOTE.—(1) Including 64 bbls. re-laid.

(2) Including 140 bbls. re-laid.

TABLE III.—REVENUE FROM OYSTER CULTURE, 1941-42

	1941-42	1940-41	1939-40	1938-39
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Sale of cardboard collectors bearing spat.....			367 20	505 20
Sale of 17 bbls. collectors with spat at 75c.....			12 75	
Sale of wire containers for spat collectors.....			3 10	36 20
Sale of separated spat—336-2/7 gals. at 70c.....		235 40		
Sale of separated spat—237-8 gals. at 65c.....	154 60			
Threshing spat from 1,004 collectors at 2c. each.....		20 08		
Threshing spat from 1,860 collectors at 1½c. each.....	27 90			
Sale of 133½ bbls. small oysters for stocking areas at \$3.....	400 50	78 00	333 00	579 00
Sale of marketable oysters from experimental farm:				
75 bbls. Substandard at \$8.10.....	607 50			
552 bbls. Standard at \$8.10 (\$6.95, 1940-41).....	4,471 20	2,968 80	2,202 60	1,510 00
73 bbls. Choice at \$10.17 (\$9.66, 1940-41).....	742 41	917 70	2,287 80	1,196 00
62 bbls. Fancy at \$13.26 (\$12.22, 1940-41).....	822 12	1,377 80	1,729 18	1,293 78
Sale of 13 bbls. oysters from St. Ann bay, N.S.....				57 32
Sale of 18 bbls. oysters from Malazash, N.S., at \$5.60.....	100 80			
Sale of 3 bbls. 3 pks. oysters from Buctouche at \$5 (\$6, 1940-41).....	16 50	216 00		
Sale of 68 gals. spat from Bras d'Or lakes at 50c.....	34 00			
Logs purchased from Department by H. V. Carr.....	15 00			
Fees for resurveys of boundaries of leases.....	4 00		27 50	21 50
Royalty on oysters taken from leases and rentals on leases.....	*2,503 69	2,308 50	2,044 01	1,758 27
Total.....	9,900 22	8,062 28	9,007 14	6,957 27

* Not final.

APPENDIX No. 6

REPORT ON THE WORK OF THE CANNED FISH INSPECTION
LABORATORY, VANCOUVER, B.C., FOR THE YEAR 1941-42

BY

F. CHARNLEY, *Chief Chemist*

Although the routine work of the Inspection Laboratory has been greatly increased during the year 1941-42 by the extension of the activities of the laboratory to include the inspection of canned herring, work on a considerable number of investigations and on other special problems has been successfully carried out. Especially valuable results have been obtained in a research in mathematical statistics that arose in connection with the problem of measuring freshness of canned fish. This investigation has provided the necessary mathematical equipment for subjecting proposed tests for spoilage of fishery products to rigorous chemical, bacteriological, and subjective (organoleptic) scrutiny.

CANNED SALMON

During the past year the study of the variations in quality of British Columbia canned salmon covering data collected over the four-year period 1936 to 1939 inclusive, has been extended to the northern (Skeena River) area, so that results showing seasonal trends in quality of British Columbia canned salmon over this period are now available for both southern and northern areas and for all the five principal species, that is, sockeye, coho, pink, chum and spring salmon. The expenditure of time and labour involved in this work has been substantial. This work, however, has been unavoidable, since a knowledge of the extent of the variations in quality indicated by these results is an indispensable prerequisite of any attempt to set up a scientifically sound plan for grading canned salmon.

CANNED HERRING

As mentioned earlier in this report, the extension of the routine examinations to parcels of canned herring has greatly increased the number of inspections that have to be carried out by the laboratory and has correspondingly diminished the amount of time that could be spent by the technically-trained members of the staff on investigations and other special problems. Furthermore, the establishment of the inspection of canned herring has involved the expenditure of a considerable amount of time in preparatory work and on preliminary investigations.

In order to provide a reliable basis for the inspection of canned herring, the tests described in the 1940-41 report were carried out on samples packed during the 1940-41 season. These tests were run on a considerably greater number of samples than the number employed in the previous investigation. The results of this work show that, where the total amount of free oil and free liquid is retained in the samples during processing, as is approximately the case with one-pound tall samples, the characteristics, free oil and free aqueous liquid, exhibit very definite seasonal variations. Under these conditions, the characteristics, free oil and free aqueous liquid, like the corresponding characteristics of canned salmon, show complementary variations, the free oil decreasing and

the free aqueous liquid increasing, as the season advances. These characteristics, of course, are unsuitable for following changes in quality of one-oval samples, since, in processing, the latter are usually inverted for a period of time to eliminate excess liquid.

The results of this investigation, however, have shown that there is a simultaneous decrease in the refractive index of the oil, as the season progresses, that is, the body oil of the herring becomes chemically more saturated, as the spawning migration proceeds. This is a very valuable result, since, by determining the refractive index of the oil, it is possible to follow changes in the intrinsic quality of the herring, as the season progresses, independently of the procedure followed in processing the herring.

RESEARCH WORK

The investigation described in the preceding section is, in a sense, research work, in that certain of these results as, for example, the seasonal trend in the refractive index of herring oil are not, as far as the writer is aware, available elsewhere.

In addition to the work on salmon and herring described above, the laboratory has, during the past season, conducted investigations of a more specialized and fundamental character. The problems in mathematical statistics already mentioned represent work of this type. These problems originally arose through the writer's attempt to deal accurately with the results obtained by the laboratory in the study of relation between the pH of the aqueous liquid in samples of canned chum salmon and the examiner's rating for freshness.

During the past year, further data have been collected in the investigation of the differences in the refractive indices of the oils of the different species of salmon. Unfortunately, the amount of time available for this problem has again been severely curtailed. Only slight progress, therefore, has been made towards completing this investigation.

Work also has been carried out on the problem of measuring freshness of both canned salmon and canned herring.

Two other problems of a research character also engaged the attention of the laboratory during the past year. One of these was a joint investigation undertaken by the Pacific Fisheries Experimental Station and the Inspection Laboratory to determine the effect of freezing and thawing on the quality of canned herring.

In the second of the last two investigations mentioned, the laboratory carried out tests on two samples of canned salmon that had been packed in British Columbia over forty years ago. These samples were kindly furnished as a matter of historical interest by one of the large fishing companies in British Columbia.

OTHER ACTIVITIES

In addition to the time expended on the work described above, a considerable amount of the writer's time has been consumed in other ways. An appreciable amount of time, for example, was spent in the preparation of specifications for canned herring, and in conferences with officers of the department, with the Liaison Officers of the British Food Ministry and with representatives of the industry. Time also was spent in discussions with representatives of the American Food and Drug Administration Laboratories, Seattle, U.S.A., who visited the Canned Fish Inspection Laboratory early in January of the present year.

APPENDIX No. 7

FINANCIAL STATEMENT DEPARTMENT OF FISHERIES, 1941-42

Vote No.	Appropriation	Amounts Authorized	Expenditure
		\$ cts.	\$ cts.
	<i>Ordinary Expenditure</i>		
70	(Salaries and Disbursements of Fishery Officers and Guardians..... Fisheries Patrol Service..... Fisheries Protection Service.....)	767,000 00	515,674 24 216,129 08 19,192 90
			750,996 22
71	Building Fishways and Clearing Rivers.....	7,000 00	3,326 26
72	Development of the Deep Sea Fisheries and the De- mand for Fish	50,000 00	29,427 68
73	Salt Fish Board (Administration).....	25,000 00	12,157 48
74	Fish Culture.....	150,000 00	175,952 43
75	Oyster Culture.....	24,000 00	21,256 19
76	Fisheries Research Board of Canada	238,000 00	218,427 82
77	International Fisheries Commission (Halibut).....	25,000 00	21,321 86
78	International Pacific Salmon Fisheries Commission...	40,000 00	39,886 30
79	Grant to the United Maritime Fishermen's Association	3,000 00	3,000 00
80	Expenses re Telagic Seal Skins.....	120,000 00	93,941 32
81	Harbour Seal Bounty.....	15,000 00	11,794 50
Statutory	Fishing Bounty.....	159,959 60	159,959 60
69	Departmental Administration.....	128,480 00	122,623 89
Statutory	Minister's Salary and Car Allowance.....	12,000 00	12,000 00
	Total Ordinary Expenditure.....	1,804,439 60	1,679,071 55
	<i>Special Expenditure</i>		
82	Extension of educational work in co-operative produc- ing and selling among fishermen.....	25,000 00	24,692 44
83	Assisting the Salt Fish Branch of the Fishing Industry.	400,000 00	594 70
	Total Special Expenditure.....	425,000 00	25,287 14
	<i>Special War Expenditure</i>		
Statutory	War Appropriation Act, 1941— Canned Lobster Control Scheme..... Wartime Fisheries Advisory Committee..... Japanese Fishing Vessels Disposal Committee..... Total Special War Expenditure.....	105,000 00 1,000 00 7,500 00 113,500 00	101,700 16 119 40 4,277 45 106,097 01
	TOTAL.....	2,342,939 60	1,810,455 70
(a)	(Pacific Halibut Treaty Special Account (Finance Department)..... (Pacific Salmon Treaty Special Account (Finance Department).....		13,713 60 21,730 32
(b)	(British Ministry of Food—Salmon..... (British Ministry of Food—Herring.....		12,756,665 69 4,296,066 77
	GRAND TOTAL.....		18,898,632 08

(a) Balance due by the United States Government on account of divisible expenditure for the fiscal year 1941-42.

(b) Purchase of Salmon and Herring by the British Government.

STATEMENT OF REVENUE RECEIVED DURING THE FISCAL YEAR 1941-42

Class	Total	General Account	Nova Scotia	P.E.I.	N.B.	Que.	Ont.	Hudson Bay	B.C.	Yukon	N.W.T.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Ordinary.....	60,871 17										
Fisheries Revenue.....			8,850 74	2,575 30	9,124 75	171 00		2 00	39,687 38	40 00	420 00
Fines and Forfeitures.....	19,428 40		818 57	632 00	1,047 00				16,930 83		
Casual Revenue.....	9,897 20	632 04	204 14	7,985 76	195 78	580 58			298 90		
Fish Culture Revenue.....	578 50				578 50						
Modus Vivendi.....	362 00		34 00						328 00		
Pelagic Sealing.....	325,131 12	325,131 12									
Premium, Discount and Exchange.....	375 22		2 87	0 48					372 37		
	416,643 61	325,763 16	9,909 82	11,193 54	10,946 03	751 58		2 00	57,617 48	40 00	420 00
Special Receipts (War).....											
Sales of Canned Lobster.....	39,087 85	28,013 60	1,494 48		222 92	5,164 99	4,191 86				
	455,731 46	353,776 76	11,404 30	11,193 54	11,168 95	5,916 57	4,191 86	2 00	57,617 48	40 00	420 00

Certified Correct,

F. O. WEEKS,

Chief Treasury Officer.

SALARIES AND DISBURSEMENTS OF FISHERY OFFICERS
AND GUARDIANS

EXPENDITURES AND SUMMARY 1941-42

NOVA SCOTIA—	
General.....	\$ 1,768 17
Head Office.....	27,973 14
District No. 1.....	38,005 25
District No. 2.....	51,612 15
District No. 3.....	53,121 31
	<hr/> \$ 172,480 02
PRINCE EDWARD ISLAND—	
General.....	487 10
District No. 1.....	34,852 22
District No. 2 (Magdalen Islands, P.Q.).....	6,604 24
	<hr/> 41,943 56
NEW BRUNSWICK—	
General.....	1,575 43
District No. 1.....	25,732 76
District No. 2.....	58,482 61
District No. 3.....	30,850 74
	<hr/> 116,641 54
GENERAL EAST.....	8,266 51
BRITISH COLUMBIA—	
Head Office.....	30,493 18
District No. 1.....	32,353 12
District No. 2.....	44,434 18
District No. 3.....	47,501 87
Canned Fish Inspection Office.....	15,777 83
	<hr/> 170,560 18
GENERAL WEST.....	5,782 43
	<hr/> \$ 515,674 24

SUMMARY

Nova Scotia.....	\$ 176,801 23
Prince Edward Island.....	36,100 58
New Brunswick.....	119,432 82
Quebec.....	6,997 00
British Columbia.....	176,342 61
	<hr/> \$ 515,674 24

FISHERIES PATROL SERVICE

EXPENDITURES AND SUMMARY 1941-42

NOVA SCOTIA—

District No. 1—

Chartered boats.....	\$	715 50	
----------------------	----	--------	--

District No. 2—

Departmental Boats.....	\$	8,656 20	
Chartered Boats.....		684 24	
			9,340 44

District No. 3—

Departmental Boats.....		11,943 81	
Chartered Boats.....		1,080 00	
			13,023 81

23,079 7

PRINCE EDWARD ISLAND—

Departmental Boats.....		3,542 01	
Chartered Boats.....		5,594 72	
			9,136 73

NEW BRUNSWICK—

District No. 1—

Departmental Boats.....		12,482 97	
-------------------------	--	-----------	--

District No. 2—

Chartered Boats.....		13,803 09	
----------------------	--	-----------	--

26,286 06

BRITISH COLUMBIA—

District No. 1—

Departmental Boats.....		19,989 02	
Chartered Boats.....		1,268 85	
General Account.....		7 84	
			21,265 71

District No. 2—

Departmental Boats.....		34,526 18	
Speed Boats.....		29 49	
Chartered Boats.....		33,130 98	
General Account.....		15 00	
			67,701 65

District No. 3—

Department Boats.....		32,380 77	
Chartered Boats.....		27,765 83	
			60,146 60

DIGBY ISLAND.....

5,406 43

POPLAR ISLAND.....

3,055 99

GENERAL—WEST.....

50 16

157,626 54

\$ 216,129 08

SUMMARY

Nova Scotia.....	\$	23,079 75
Prince Edward Island.....		9,136 73
New Brunswick.....		26,286 06
British Columbia.....		157,626 54
		<u>\$ 216,129 08</u>

FISHERIES PROTECTION SERVICE

EXPENDITURE SUMMARY—1941-42

West Coast.....	\$	19,192 90
-----------------	----	-----------

DEPARTMENT OF FISHERIES

DEVELOPMENT OF THE DEEP SEA FISHERIES AND
THE DEMAND FOR FISH

EXPENDITURE 1941-42

Aids in expanding demands for Fish.....	\$	13,350	17
Educational Work.....		6,721	06
Miscellaneous.....		2,030	56
Subsidy Bait Collection.....		2,500	00
Subsidy Bait Freezers.....		100	00
Fisheries Intelligence Bureau.....		1,027	00
Advertising.....		3,580	07
Destruction of Sea Lions.....		118	82
	\$	29,427	68

FISHERIES RESEARCH BOARD OF CANADA

EXPENDITURE 1941-42

	Expenditures				
	From Vote		From Revenues		Total
	\$	cts.	\$	cts.	\$ cts.
Atlantic Biological Station—St. Andrews, N.B.....	48,543	07			48,543 07
Pacific Biological Station—Nanaimo, B.C.....	51,856	79	2,200	00	54,056 79
Atlantic Experimental Station—Halifax, N.S.....	40,607	20			40,607 20
Gaspé Experimental Station, Grand River, Que.....	16,989	44			16,989 44
Pacific Experimental Station—Prince Rupert, B.C.....	38,248	96			38,248 96
Administration and General Fund—					
Toronto Office (A. G. Huntsman).....	9,685	34			9,685 34
Atlantic Salmon Investigation.....	4,790	28			4,790 28
Publications.....	3,443	36			3,443 36
General.....	4,263	38	831	11	5,094 49
	218,427	82	3,031	11	221,458 93

FISHERIES EXPENDITURES 1941-42 BY PROVINCES

Appropriation	General		Nova Scotia		Prince Edward Island		New Brunswick		Quebec		Ontario		Manitoba		Saskatchewan		Alberta		British Columbia		Total	
	\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.
Salaries and Disbursements of Fishery Officers and Guardians																					515,674 24	
Fisheries Patrol Service			176,801 22		36,100 58		119,432 82		6,997 00												176,342 61	
Fisheries Protection Service			23,019 77		9,136 73		23,288 00														157,626 54	
Building Fishways and Clearing Rivers																					19,192 90	
Development of the Deep Sea Fisheries and the Demand for Fish			1,156 42		37 52		38 98														2,093 34	
Salt Fish Board (Administration)	6,008 17				974 48		3,587 30		2,404 55		4,199 98		2,410 17		540 00		134 84				3,019 92	
Oyster Culture			5,667 90																			
Fisheries Research Board of Canada			12,157 48		7,972 44		60,727 83														865 02	
International Fisheries Commission (Halibut)	13,447 40		92,669 54		14,285 03		533 65														21,256 19	
International Pacific Salmon Fisheries Commission	1,000 00		6,286 58		6,690 83		41,852 24		10,959 44												90,105 75	
Grant to United Maritime Fishermen's Association			45,397 48																		24,321 86	
Expenses of Pacific Seal Skins																					39,886 30	
Halibut Seal Bounty	93,941 32		1,000 00		1,000 00		1,000 00														3,000 00	
Fishing Bounty			4,040 00		957 50		1,037 50														93,941 32	
Extending educational work in co-operative producing			78,551 60		10,563 40		19,663 60		51,181 00												11,794 50	
Assisting the Salt Fish Board at the Fishing Industry			10,070 41		2,344 95		6,376 90		3,580 64												5,699 50	
War Appropriation Act, 1941			177 88		20 00		239 94		156 88												2,339 64	
Canned Lobster Control Scheme			30,319 67		16,774 58				3,969 37		50,636 54											
War-time Fisheries Advisory Committee	119 40																				119 40	
Japanese Fishing Vessels Disposal Committee																					4,277 45	
Departmental Administration	131,059 52		487,686 31		106,778 04		280,836 72		85,778 88		54,836 50		2,410 17		540 00		134 84				1,675,831 81	
Minister of Fisheries—																					122,623 89	
Salary and Car Allowance																						
(a) Special Account Halibut (Finance Dept.)	12,000 00																				12,000 00	
(a) Special Account Salmon (Finance Dept.)																					13,713 60	
(b) British Ministry of Food—Salmon																					21,730 32	
(b) British Ministry of Food—Herring																					12,756 66 69	
																					4,296 06 77	
	265,683 41		487,686 31		106,778 04		280,836 72		85,778 88		54,836 50		2,410 17		540 00		134 84				17,613,947 21	
																					18,898,632 03	

NOTE.—(a) Balance due by the United States Government on divisible expenses at the close of the fiscal year 1941-42.

(b) Purchases of Salmon and Herring by the British Government.

STATEMENT *RE* SHIPMENTS OF CANNED SALMON TO THE UNITED KINGDOM
FOR WHICH PAYMENT WAS MADE IN THE FISCAL YEAR 1941-42

Grade	Size	No. of tins per case	No. of cases	Rate per case	Payments
				\$ cts.	\$ cts.
1.....	$\frac{1}{2}$ lb	96	275,942	13 75	3,794,202 50
	$\frac{3}{4}$ lb	96	129,441	8 62 $\frac{1}{2}$	1,116,428 62
	1 lb	48	7,212	12 50	90,150 00
	Total Grade 1.....		412,595		5,000,781 12
	Equiv. in full cases.....		347,874 $\frac{1}{2}$		
2.....	$\frac{1}{2}$ lb	96	151,846	10 00	1,518,460 00
	$\frac{3}{4}$ lb	96	92,200	6 75	622,350 00
	1 lb	48	47,163	8 75	412,676 25
	Total Grade 2.....		291,209		2,553,486 25
	Equiv. in full cases.....		245,109		
3.....	$\frac{1}{2}$ lb	96	279,987	6 25	1,749,918 75
	$\frac{3}{4}$ lb	96	116,285	4 37 $\frac{1}{2}$	508,746 87
	1 lb	48	496,128	5 00	2,480,640 00
	Total Grade 3.....		892,400		4,739,305 62
	Equiv. in full cases.....		834,257 $\frac{1}{2}$		
	TOTALS.....		1,596,204		12,293,572 99

(Equiv. in full cases—1,427,241)

Less deduction at 15 cents a case on 1,857 cases packed in
fibre cases instead of wooden.....\$ 278 55

Less 10% payment on fish in storage, paid in 1942-43 (Grade
3, 20,561 cases $\frac{1}{2}$ lb cans and 49,519 cases 1 lb cans).....\$ 37,610 13

37,888 68

PAYMENTS FOR SALMON.....\$ 12,255,684 31

PAYMENTS for affixing labels at 8 cents a case for half and
quarter lb cans, and 5 cents a case for one lb cans.....109,605 94

FREIGHT PAYMENTS.....391,375 44

TOTAL.....\$ 12,756,665 69

STATEMENT *RE* SHIPMENTS OF CANNED HERRING TO THE UNITED KINGDOM
FOR WHICH PAYMENT WAS MADE IN THE FISCAL YEAR 1941-42

Type of Container	Size	No. of cans per case	No. of cases	Rate per case	Payments
				\$ cts.	\$ cts.
Ovals.....	1 lb	48	702,685	3 75	2,635,068 75
Talls.....	1 lb	48	214,144	3 30	706,675 10
Ovals.....	$\frac{1}{2}$ lb	48	227,764	3 10	706,068 40
	Total.....		1,144,593		

(Equiv. in full cases—1,030,711)

PAYMENTS FOR HERRING.....\$ 4,047,812 25

PAYMENTS FOR TOMATO PUREE when supplied by the canner, at 25 cents
a case.....36,023 75

PAYMENTS FOR FREIGHT.....212,230 77

TOTAL.....\$ 4,296,066 77

EXPENDITURES BY THE DOMINION GOVERNMENT ON ACCOUNT OF FISHERIES SERVICE SINCE CONFEDERATION

—	Fish Inspection etc.	Fish Culture	Fisheries Research Board	Dev. D.S. Fish., etc.	Fishing Bounty	Sundry Services	Total
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
To 1940-41 (a)....	34,442,683 45	11,388 022 90	3,932,759 18	2,382,254 64	9,348,621 07	10,356,689 88	71,851,031 12
1941-42.....	750,996 22	175,952 43	221,458 93	29,427 68	159,959 60	475,691 95	1,813,486 81
	35,193,679 67	11,563,975 33	4,154,218 11	2,411,682 32	9,508,580 67	10,832,381 83	73,664,517 93

(a) For details by fiscal years see Appendix No. 6 of the Departmental Report for 1940-41.

SUMMARY BY PROVINCES

General.....	\$ 6,167,544 39
Nova Scotia.....	20,167,465 52
Prince Edward Island.....	3,525,153 36
New Brunswick.....	10,430,529 84
Quebec.....	5,808,089 19
Ontario.....	4,202,496 70
Manitoba.....	1,816,514 96
Manitoba and North West Territories.....	24,771 76
North West Territories.....	71,242 18
Saskatchewan.....	579,946 88
Alberta.....	641,434 77
British Columbia.....	20,199,969 95
Yukon.....	29,358 43
	<u>\$ 73,664,517 93</u>

REVENUE COLLECTED BY THE DOMINION GOVERNMENT ON ACCOUNT OF THE FISHERIES SERVICE SINCE CONFEDERATION

—	Fisheries Revenue and Fines and Fort.	Casual Revenue	Pelagic Sealing Revenue	Sundry Revenues	Total
To 1940-41 (a).....	5,787,534 83	247,622 11	1,757,411 34	5,149,693 32	12,942,261 60
1941-42.....	80,299 57	9,897 20	325,131 12	40,403 57	455,731 46
	5,867,834 40	257,519 31	2,082,542 46	5,190,096 89	13,397,993 06

(a) For details by fiscal years see Appendix No. 6 of the Departmental Report for 1940-41.

SUMMARY BY PROVINCES

General.....	\$ 6,919,714 07
Nova Scotia.....	805,347 53
Prince Edward Island.....	183,105 94
New Brunswick.....	715,268 55
Quebec.....	358,575 21
Ontario.....	561,138 94
Manitoba.....	335,474 08
Manitoba and North West Territories.....	7,416 45
North West Territories.....	9,478 23
Hudson Bay District.....	1,189 98
Saskatchewan.....	95,152 41
Alberta.....	234,497 16
British Columbia.....	3,153,935 76
Yukon.....	17,698 75
	<u>\$ 13,397,993 06</u>

DOMINION OF CANADA

THIRTEENTH

ANNUAL REPORT

OF THE

DEPARTMENT OF FISHERIES

SEVENTY-SIXTH ANNUAL FISHERIES
REPORT OF THE DOMINION

FOR THE YEAR
1942-43



OTTAWA
EDMOND CLOUTIER
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1943

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*To His Excellency Major-General the Right Honourable the Earl of Athlone,
K.G., P.C., G.C.B., G.M.M.G., G.C.V.O., D.S.O., A.D.C., Governor
General and Commander-in-Chief of the Dominion of Canada*

MAY IT PLEASE YOUR EXCELLENCY:

I have the honour herewith, for the information of Your Excellency and the Parliament of Canada, to present the Thirteenth Annual Report of the Department of Fisheries, being the Seventy-sixth Annual Fisheries Report for the Dominion.

I have the honour to be,

Your Excellency's most obedient servant,

ERNEST BERTRAND,
Minister of Fisheries.

DEPARTMENT OF FISHERIES,
OTTAWA, May 31, 1943.

DEPUTY MINISTER'S REPORT

To the Hon. ERNEST BERTRAND, M.P.,

Minister of Fisheries.

SIR,—I have the honour to submit the Seventy-sixth Annual Report on the Fisheries of Canada, which is the Thirteenth Annual Report of the Department of Fisheries and covers the fiscal year 1942-43.

The report for the preceding year was reduced substantially in size for reasons of economy. For the same reasons expansion of the present report has been avoided as far as possible. The report deals with the results of commercial fishing operations in the Dominion during the calendar year 1942 and with various related matters. Several appendices relate in some detail to different branches of the Department's work. These appendices include:—

The Reports of the Chief Supervisors of Fisheries.

A Report on Oyster Culture.

A Report on the Department's Fish Culture Work.

The Report of the Fisheries Engineer.

Reports on the Work of the Canned Fish Inspection Laboratories.

The Annual Financial Statement.

* FISHERIES RESULTS IN THE CALENDAR YEAR 1942

Canada's fisheries production in 1942 exceeded the output of 1941 by slightly more than 20 per cent in total marketed value and was worth very nearly \$75,041,000—much the highest level in the Dominion's history. So far as return to the fishermen is concerned—that is, the value of catch to the fishermen at point of landing—there was an increase of more than \$7,000,000 in 1942, which brought the year's total to \$41,709,000. The total commercial landings for the Dominion, sea and freshwater landings, combined, were somewhat larger than the 1941 catch, or 12,062,700 hundredweights as against 11,918,100, but it was the greater firmness in fish prices generally that accounted for the very large increases in landed and marketed value.

Of the marketed value total about \$65,933,000 was derived from sea fisheries operations and \$9,107,700 from the freshwater fisheries. The gain on the sea fisheries side exceeded \$11,607,000 and in the case of the freshwater fisheries the gain was about \$1,175,000. Marketed value increased in each of the nine provinces but in the Yukon Territory, where production is always very small, there was a decrease. By provinces, the largest gain, or roughly \$6,300,000, was in British Columbia where the year's output was valued at \$38,059,000. In Nova Scotia, the second ranking province, the marketed value totalled nearly \$15,297,500, or \$2,600,000 and more above the 1941 figures. In New Brunswick the increase was about \$1,600,000, in Quebec \$1,350,000, Prince Edward Island \$687,500, Ontario \$584,900, Manitoba \$340,000, Saskatchewan \$170,000, and Alberta about \$51,000. Ontario continued first in value of freshwater production, with a return of \$4,103,000 to its credit, and Manitoba was second with an output valued at \$3,577,000.

* In general, the figures in this review are stated in round numbers.

The following table gives the marketed value figures for 1942, by provinces, showing returns from the sea fisheries and the freshwater fisheries separately:—

	Sea	Inland	Totals
	\$	\$	\$
Nova Scotia.....	15,297,446	.....	15,297,446
New Brunswick.....	7,059,718	28,584	7,088,302
Prince Edward Island.....	1,639,539	.....	1,639,539
Quebec.....	3,876,905	317,187	4,194,092
Ontario.....	.....	4,103,345	4,103,345
Manitoba.....	.....	3,577,616	3,577,616
Saskatchewan.....	.....	585,782	585,782
Alberta.....	.....	492,182	492,182
British Columbia.....	38,059,559	.....	38,059,559
Yukon.....	.....	3,056	3,056
Totals.....	65,933,167	9,107,752	75,040,919

Appendices 1 and 2 contain reference in more or less detail to the results of operations in various sea fisheries while complete statistical details will be found in *Fisheries Statistics of Canada 1942*, prepared jointly by the department and the Dominion Bureau of Statistics, with the collaboration of provincial services concerned with fisheries affairs. In the present review, therefore, there will be reference only to results of the year's operations in several of the fisheries of first rank in importance.

From the standpoint of marketed value return the salmon fishery was much ahead of any other during the past year, a state of affairs which is the normal condition and one chiefly due, of course, to the productivity of Pacific Coast salmon waters. Actually the 1942 salmon catch on both coasts combined, 1,645,000 hundredweights, was substantially smaller than the catch of 1941 but, notwithstanding that, there was a value increase of \$1,450,000, which brought the total up to \$22,901,000.

British Columbia canned salmon pack represented \$20,050,000 of the aggregate. The pack from 1942-caught fish, 1,811,000 cases, showed a sharp decrease of over 400,000 cases from the output of 1941 but it is to be remembered that cannery production in the earlier year reached record figures. All of the 1942 pack, except for certain quantities required for Canada's own war supply purposes and for distribution by the Red Cross to Canadian prisoners of war, was made available to the British Ministry of Food under an agreement between Ottawa and London. In the preceding year two-thirds of the pack, or nearly 1,500,000 cases, had been supplied to Britain but 1942 supplies to the United Kingdom were well above that figure. In both years supervision of the plan for supplying canned salmon to meet British food needs was in the hands of the Department of Fisheries.

The sea herring fishery, which in 1940 had been second only to the salmon fishery in point of marketed value but had dropped to third place in 1941, was again in second position in 1942. The explanation, of course, is almost entirely in the effort put forth to meet Great Britain's continued urgent need of large supplies of canned herring. Total sea herring catch in the year exceeded 3,581,500 hundredweights, as against slightly less than 2,739,600 hundredweights in 1941, and the output of canned fresh herring was close to 1,642,400 cases as against 1,037,500 cases. Under an agreement between the Canadian and British governments, supervised on the Canadian side by this department, the entire output of canned fresh herring, save for a relatively small portion, was supplied to the people of Britain. Herring marketed value for the year was \$10,707,500 as compared with approximately \$6,482,000 in the year before. In the 1942 total canned herring accounted for \$7,243,900.

In the cod fishery, almost wholly an Atlantic fishery, the catch of 1,942,300 hundredweights showed a decrease of something like 13,000 hundredweights, but on the value side there was an increase of more than \$2,450,000, which brought the return up to \$9,963,800. The lobster fishery, an Atlantic Coast fishery, came next after the cod in marketed value—\$5,084,500, an increase of over \$1,200,000. Rated according to marketed value the other principal sea fish taken were halibut, sardines, pilchards and mackerel. Each of them produced more dollars than in 1941, with the value totals ranging from \$2,456,000 in the case of halibut to \$1,318,000 in the case of mackerel.

In the freshwater fisheries whitefish, pickerel, saugers and lake trout ranged well ahead of all others in point of marketed value. Whitefish came first, as is the usual condition, with a value of a little more than \$3,055,300. Pickerel brought more than \$1,440,700 all told and saugers more than \$1,238,000. Lake trout return showed some decrease.

Capital Investment and Employment.—Total capital represented by boats, vessels, gear, shore plants, equipment, etc., in use in the fisheries during the year was \$62,420,000, or nearly \$7,330,000 more than in 1941. Most of the increase, or \$5,809,700, was in the value of shore plants and equipment, and the aggregate investment in boats, vessels and fishing gear, \$29,075,400, was less by over \$4,200,000 than the amount invested in plant and machinery. So far as personnel goes, the year saw a continuation of the reduction in working force which had been seen in 1941, although the rate of decrease was somewhat less sharp. The number of fishermen was 61,367 (47,554 engaged in sea fisheries and 13,813 in freshwater operations) as against a 1941 figure of 63,745 (48,441 in sea fisheries, and 15,304 freshwater fishermen). Plant employees numbered 15,589 as against 15,842. Total fisheries employees, 76,956, were thus 2,631 fewer than in the earlier year.

SEA FISHERIES

The year's landings of sea fish and shellfish amounted in all to 11,234,000 hundredweights which exceeded the 1941 landings by about 209,000 hundredweights. The credit for the gain goes mainly to British Columbia but Quebec and Prince Edward Island also contributed to it. In each of the other two sea fisheries provinces, Nova Scotia and New Brunswick, catch decreased. Sea fisheries catch, by provinces, for each of the two years was as follows:—

	1942	1941
	cwts.	cwts.
Nova Scotia.....	2,551,281	2,678,046
New Brunswick.....	1,615,281	1,761,871
Prince Edward Island.....	292,454	249,776
Quebec.....	1,062,644	916,616
British Columbia.....	5,712,725	5,418,891
Totals.....	11,234,385	11,025,200

Herring and pilchards had most to do in bringing about the net gain in British Columbia. The herring landings in the province increased by some 630,000 hundredweights and the pilchard landings by roughly 117,000. Pacific salmon catch, on the other hand, decreased by about 279,000 hundredweights. British Columbia halibut landings also decreased, with the result that Dominion catch from the halibut fisheries was smaller than in the preceding year, for much the greater share of Canada's halibut production comes from the Pacific coast.

Of the year's total catch of cod, 1,942,000 hundredweights, all was taken by Atlantic fishermen, save 6,700 hundredweights landed in British Columbia waters. The Atlantic landings were not quite as large as in the preceding year but, in spite of the decrease in quantity, the return to the fishermen in landed value, \$5,570,400, showed a gain of something more than \$1,500,000. Two-thirds of the catch was taken by fishermen of Nova Scotia.

On the Atlantic coast, as well as in British Columbia, sea herring catch for the year increased. All told, the Atlantic landings were 1,256,700 hundredweights or 200,000 hundredweights and more above the 1941 production. New Brunswick was the largest producer among the four Atlantic provinces, with Quebec, Nova Scotia and Prince Edward Island following in order and there was increase everywhere except in the island province. However, the landings of sardine herring, nearly all of them made in southwestern New Brunswick, were only 316,500 barrels, a decrease of 116,000. There is no fishing for sardine herring in British Columbia waters although the herring of the two coasts are similar species.

Lobsters are not taken in the Pacific area but in the Atlantic region the lobster fishery ranks second only to the cod fishery in dollar importance, and, indeed is of special significance since it is the chief fishery of its kind in the world. Because of its character and importance careful steps are taken by the department for its regulation, in the interest of adequate conservation, but in 1942 there was a modest increase of a couple of thousand hundredweights in catch and landings amounted in all to 280,250 hundredweights. On the dollar side, however, the increases were relatively much larger. The return to the fishermen in landed value exceeded \$3,888,000, or more than \$975,000 above 1941 and marketed value totalled \$5,084,500 as compared with \$3,858,700. The following table shows by provinces the 1942 catch, the quantities shipped in shell, the pack of canned lobster and the pack of tomalley:—

	Catch		Shipped in Shell		Canned		Tomalley	
	Cwts.	Marketed Value	Cwts.	Marketed Value	Cases	Marketed Value	Cases	Marketed Value
		\$		\$		\$		\$
Nova Scotia.....	128,471	2,451,849	82,659	1,783,230	21,696	612,250	1,674	19,161
New Brunswick.....	69,530	1,565,038	36,986	825,827	17,436	581,894	1,436	17,525
P. E. Island.....	64,454	837,272	10,947	192,085	19,788	596,071	1,679	24,396
Quebec, including Magdalen Islands...	17,795	230,399	6,119	78,754	4,615	129,374	170	2,521
(Magdalen Islands).	15,808	200,357	5,232	64,116	4,055	113,970	170	2,521
Totals.....	280,250	5,084,558	136,711	2,879,896	63,535	1,919,589	4,959	63,603

Shipments of lobster meat, 3,450 hundredweights, were well below the total for 1941.

INLAND FISHERIES RESULTS

Total commercial catch from the Dominion's freshwater fishing areas during the year was about 828,400 hundredweights, a relatively sharp decrease from production in 1941 when the landings were nearly 893,000 hundredweights. On the landed value side, however, there was an increase of some \$950,000, and as already noted the rise in marketed value was approximately \$1,175,000. Value increases were general throughout the freshwater areas, except in the Yukon.

Freshwater landings by provinces were as follows:—

	Cwts.
New Brunswick	8,106
Quebec	53,204
Ontario	263,780
Manitoba	359,353
Saskatchewan	81,802
Alberta	61,850
Yukon	283
Total	828,378

EXPORTS OF FISHERIES PRODUCTS

Fisheries products shipped out of the country during 1942 were valued in all at a little more than \$51,907,000, which meant that 1941 value was exceeded by \$8,943,800 or about 21 per cent. As compared with 1939, which, for the most part, was a peace year, there was a value increase last year of over \$22,200,000. The 1942 gain over 1941 total was in the value of the shipments to the United States and the United Kingdom, shipments to other countries showing a net decrease.

So far as exports to the United States are concerned, the year's increase over 1941 figures was nearly \$6,150,000 and in the case of the United Kingdom it was \$4,506,000. Shipments sent elsewhere decreased by \$1,712,000.

The three main groups of fisheries exports are fresh and frozen fish, canned fish, and fish in the dried, pickled and smoked forms. In each case the 1942 totals were much larger than those for the year before: Fresh and frozen fish, \$18,858,250, an increase of \$3,673,500; canned fish, \$21,770,700, an increase of \$3,328,300; dried, pickled and smoked fish, \$7,299,900, an increase of \$1,414,700. The United States, of course, always buys many times as much Canadian fish in the fresh and frozen category as is purchased by the other buyer-countries combined. All save about a half million dollars of the 1942 export business in products in this group was done with the United States and the sales to other countries, principally Great Britain, decreased. Lobsters, salmon, halibut, whitefish, cod and haddock were the principal species entering into the fresh and frozen trade.

The gain in total export value of dried, pickled and smoked fish was likewise traceable to bigger business with the United States. As is always the case, shipments of these products to the United Kingdom were relatively trifling, though, in fact, they showed a small dollar gain, and the value of the shipments to countries other than Britain and the United States decreased by close to \$500,000. On the other hand, the United States purchases of products in this category exceeded those of 1941 by nearly \$2,000,000.

In the case of canned fish, however, the year's rise in total export value was attributable to the shipments to the United Kingdom. A moderate increase in the sales to the United States was more than offset by reduction in the sales to various other countries, but Canada sent the British people enormous quantities of canned salmon and canned herring during the year, as one step in the national war effort, and canned fish shipments to Britain thus had a value of \$18,277,300 as compared with slightly less than \$14,160,000 in 1941.

Apart from products in the three main classifications various other fisheries commodities, of course, such as fish meal, fish, whale and seal oil, and some miscellaneous products, were also exported last year. Oil shipments to the United Kingdom, \$1,084,400, showed an increase of more than 100 per cent in value, but shipments to the United States, \$820,000, decreased by something over 25 per cent. Practically all of the meal exports went to the United States.

DEPARTMENT OF FISHERIES

DRIED FISH PRODUCTION

Several war-born factors combined in 1942 to check the process of increase in the dried fish industry's output which had been evident in the two preceding years. Production of dried fish was 201,900 hundredweights and of dried boneless fish 39,300 hundredweights, using round figures in each case, or about 241,300 hundredweights in all, as compared with 282,500 hundredweights, round figures again, in 1941. The net decrease was due to reduction in the pack of dried fish. Production of boneless fish showed an increase of well over one-third, a state of affairs which may be taken as resulting, in large measure, from the department's action, begun several years ago, in making expert instruction in the processing of this product available to the fishermen on various parts of the Atlantic coast, the only part of the Dominion where the dried fish industry operates. If the industry's total output in 1942 showed decrease, however, there was, on the other hand, a substantial rise in total value. All told, the pack was worth nearly \$2,944,460, or an increase of more than \$409,400. The average value of dried fish was \$11 per hundredweight, as against \$8.40 in 1941, and in the case of boneless fish the average value per hundredweight rose from \$14.10 in 1941 to \$18.40.

The following tables show, by provinces, the production and marketed value of dried fish and dried boneless fish, respectively, during the past two calendar years, and the output and value of the two products combined:—

PRODUCTION OF DRIED FISH

	1942		1941	
	Cwts.	Marketed Value	Cwts.	Marketed Value
		\$		\$
Nova Scotia.....	109,699	1,181,425	163,570	1,359,888
New Brunswick.....	22,094	253,120	23,957	197,427
Prince Edward Island.....	6,293	55,032	1,868	13,991
Quebec.....	63,887	730,878	64,685	566,311
	201,973	2,220,455	254,080	2,137,617

PRODUCTION OF BONELESS DRIED FISH

	1942		1941	
	Cwts.	Marketed Value	Cwts.	Marketed Value
		\$		\$
Nova Scotia.....	30,096	577,299	26,131	371,512
New Brunswick.....	3,765	70,351	1,393	18,307
Prince Edward Island.....	715	14,310	92	1,100
Quebec.....	4,789	62,044	849	10,443
	39,365	724,004	28,464	401,362

TOTAL PRODUCTION OF DRIED AND BONELESS FISH

	1942		1941	
	Cwts.	Marketed Value	Cwts.	Marketed Value
		\$		\$
Total production and market value.....	241,338	2,944,459	282,544	2,538,979

FISHING BOUNTY

Fishing bounty paid on the Atlantic coast for the 1942 season amounted in all to \$159,930.60, and those receiving payments were the owners and crews of 668 vessels and 8,859 fishing boats. Vessel owners and the 3,216 fishermen on vessels received, in all, \$37,854.90, and boat owners and boat fishermen, the latter totalling 15,102, shared in \$122,075.70. Bounty payments in Nova Scotia amounted to \$75,249, in New Brunswick \$21,220, Prince Edward Island \$9,596.80, and Quebec \$53,864.80.

Bounty payments are made under authority of "An Act to Encourage the Development of Sea Fisheries and the Building of Fishing Vessels". Bounty is paid yearly under the empowering act but from year to year there are minor variations in the basis of distribution, depending upon the number of men and craft eligible for payment. The basis for the 1942 season was as follows: (1) to owners of vessels entitled to receive bounty, \$1 per registered ton, payment to the owner of any one vessel not to exceed \$80; (2) to vessel fishermen entitled to receive bounty, \$8 each; (3) to owners of boats measuring not less than 12 feet along the keel, \$1 per boat; (4) to boat fishermen entitled to receive bounty, \$7.50 each.

The following table gives details of the past year's distribution:—

1942 - 1943

Province and County	Boats	Men	Amount	Vessels	Tons	Average Tons	Men	Amount	Total Amount
			\$ cts.					\$ cts.	\$ cts.
<i>Nova Scotia—</i>									
Annapolis.....	150	242	1,965 00						1,965 00
Antigonish.....	107	160	1,307 00						1,307 00
Cape Breton.....	200	326	2,645 00	43	642	15	166	1,969 60	4,614 60
Cumberland.....	3	3	25 50						25 50
Digby.....	273	467	3,775 50	38	512	14	82	1,168 00	4,943 50
Guysborough.....	441	680	5,541 00	36	461	12	102	1,277 00	6,818 00
Halifax.....	623	802	6,636 30	25	483	20	179	1,910 80	8,547 10
Inverness.....	207	527	4,159 30	8	87	11	46	454 40	4,613 70
Kings.....	56	65	543 50						543 50
Lunenburg.....	574	687	5,727 60	53	3,014	57	947	10,585 70	16,313 30
Pictou.....	22	35	284 50						284 50
Queens.....	135	204	1,664 90	10	109	11	31	357 00	2,021 90
Richmond.....	322	594	4,776 20	10	125	12	34	396 40	5,172 60
Shelburne.....	526	823	6,698 30	95	1,467	16	329	4,098 60	10,796 90
Victoria.....	229	343	2,801 40	15	195	13	60	674 50	3,475 90
Yarmouth.....	83	157	1,260 50	68	923	14	203	2,545 50	3,806 00
Totals.....	3,951	6,115	49,811 50	401	8,018	20	2,179	25,437 50	75,249 00
<i>New Brunswick—</i>									
Charlotte.....	176	330	2,642 40	18	234	13	53	657 90	3,300 30
Gloucester.....	473	862	6,933 70	123	2,333	19	526	6,538 70	13,472 40
Kent.....	160	265	2,147 00	16	178	11	31	426 00	2,573 00
Northumberland.....	30	70	554 70	21	227	11	50	626 70	1,181 40
Restigouche.....	5	8	65 00						65 00
St. John.....	11	16	131 00						131 00
Westmoreland.....	32	62	496 90						496 90
Totals.....	887	1,613	12,970 70	178	2,972	17	660	8,249 30	21,220 00
<i>Prince Edward Island—</i>									
Kings.....	246	352	2,885 50						2,885 50
Prince.....	346	594	4,797 20	1	12	12	2	28 00	4,825 20
Queens.....	132	234	1,886 10						1,886 10
Totals.....	724	1,180	9,568 80	1	12	12	2	28 00	9,596 80
<i>Quebec—</i>									
Bonaventure.....	377	707	5,672 90	19	232	13	72	807 90	6,480 80
Gaspé.....	2,055	4,029	32,263 00	69	909	13	303	3,332 20	35,595 20
Matane.....	89	146	1,183 70						1,183 70
Saguenay.....	776	1,313	10,605 10						10,605 10
Totals.....	3,297	6,195	49,724 70	88	1,141	13	375	4,140 10	53,864 80
Grand Totals.....	8,859	15,103	122,075 70	668	12,143	19	3,216	37,854 90	159,930 60

NOTE.—A number of "late" claims, amounting in all to \$5,264.20, included in this statement, are for the 1941 season. As the basis of distribution for 1941 differed from that of 1942, a number of the figures in the "Amount" columns do not as a result, balance with the number of claims paid.

FUR SEAL RETURNS

Canada's net receipts on fur seal account in the fiscal year 1942-43 were \$212,131.35, which represented the Dominion's fifteen per cent interest in pelts taken by the United States Government at the Pribilof Island rookeries. There was no hunting of fur seals in 1942-43 and the skins which contributed toward the year's Canadian receipts were all, or very nearly all, from the 1941 "take". Under the Pelagic Sealing Treaty—the treaty became inoperative in the latter part of 1941 but has now been replaced by a provisional agreement of similar import between Canada and the United States—the Dominion was entitled to fifteen per cent, in number and value, of each year's "take" at the Pribilofs and adjacent rookeries, where sealing was entirely in the hands of the United States authorities by virtue of the treaty terms. During most of the treaty period (1911-1941) Canada took its share of the returns in dollar payments from the United States but, more recently, had taken the pelts themselves. For a time, under this latter plan, the Canadian skins were dressed and dyed and sold in Great Britain, but subsequently, while continuing to have the skins processed in London, the Dominion made its sales through established fur auctions at Montreal. The 1942-43 receipts consisted in part of payments from the United States but in much the larger part, or in round figures \$202,700, of net proceeds from the sale of 5,247 skins at the Montreal auctions. The payments from Washington, something over \$9,000, made up the Canadian percentage share of the net proceeds from the sale by the United States of 8,080 skins which were sold at St. Louis, Mo., an important fur-marketing centre.

As compared with returns in the preceding year, there was a decrease of \$113,000 in the Canadian receipts of 1942-43. The explanation of the decrease is in the fact that fewer skins were handled. Average price per skin showed increase. The average price paid at the Montreal auctions in 1942-43 for the pelts sold on Government account was \$37.35, which was slightly more than \$7 above the average paid in the year before.

As already pointed out, the Pelagic Sealing Treaty, which had been made forty years before by Great Britain, the United States, Russia, and Japan, ceased to be operative in the closing part of 1941. Notice of intention to abrogate had been given by the Japanese Government in 1940. Under the treaty all pelagic sealing was prohibited in the American waters of the North Pacific, except to certain aborigines, and the killing of seals at the rookeries was carried on entirely by the United States authorities. Canada was entitled by the treaty terms to fifteen per cent of the annual United States "kill" and was also entitled to share in the proceeds from skins taken on the eastern side of the North Pacific by Japan and Russia. Canadian fur seal receipts in 1941-42 included some payments from Japan but, so far as Russia was concerned, the treaty had not been operative for some years prior to its formal abrogation.

The provisional agreement between Canada and the United States as to the control of sealing at the Pribilofs and other North American areas came into effect as from June, 1942. The only important difference between its terms and those of the former treaty, so far as their effect upon Canada is concerned, is that the Dominion is now entitled to twenty per cent of the annual "take" of skins, instead of fifteen per cent. The hunting of fur seals will continue to be in the hands of the United States Government and pelagic sealing will be prohibited, except to Indians and other aborigines living on the coasts adjacent to the treaty waters.

FISH CULTURE

During 1942 the department continued to carry on its fish cultural work in Nova Scotia, New Brunswick and Prince Edward Island where the fisheries are under federal administration, or largely so. Only the more important

freshwater and anadromous food and game fishes, such as Atlantic and seabago salmon and speckled and rainbow trout were propagated. Thirteen hatcheries were operated and, in addition, 6 rearing stations, 6 salmon-retaining ponds and several egg-collecting camps. The year's total output from them was 32,523,000. Further information with regard to the output and other details of the fish cultural work will be found in Appendix No. 3.

INTERNATIONAL FISHERIES COMMISSION, 1942

As provided in the treaty of January 29, 1937, between Canada and the United States, the International Fisheries Commission continued in 1942 the regulation of the Pacific halibut fishery and the investigations of the fishery and of the stocks of halibut upon which the regulations are based.

Meetings of the Commission were held at Vancouver on April 14 and at Seattle on December 10, 11 and 12. During these meetings, the results of investigations were examined and matters pertaining to regulations were considered.

As in previous years, the Commission maintained close contact with the fishing industry. On December 11, the Commission met at Seattle with the Conference Board, composed of representatives of the halibut fishing fleets of Alaska, British Columbia and Washington. The effect of regulation upon the condition of the halibut stocks was discussed and recommendations for the regulation of the fishery in 1943 were received.

New halibut fishing regulations were issued on March 25. These differed in a few respects from those of the previous year. They ended the winter closed season and opened the fishing season at midnight of April 15, or fifteen days later than in 1941. They continued the Area 2 catch limit of 22,700,000 pounds but increased from 26,300,000 to 26,800,000 pounds the catch limit in Area 3, where the stock of halibut was showing continued improvement. They re-defined several boundary lines, without significant change in locations, on the basis of the most recently published charts. As an aid to sea patrol on grounds closed to halibut fishing, they made the licence of any vessel invalid for the possession of halibut in any area other than that for which the licence was validated, if the vessel had baited gear on board, except in the immediate vicinity of the boundary between Areas 2 and 3.

The fishing season began in all areas on April 16, fifteen days later than in 1941. The catch limit of Area 2 was reached, and Areas 1 and 2, comprising all grounds south of Cape Spencer, Alaska, were closed to halibut fishing at midnight of June 29, one day earlier than in the preceding year. The Area 3 catch limit was attained and Areas 3 and 4, including all grounds north and west of Cape Spencer, were closed at midnight of September 25, eleven days later than in 1941. Permits for the retention of halibut caught incidentally during fishing for other species in Areas 1 and 2 after closure to halibut fishing became invalid at midnight of October 15, twenty days after the closure of Areas 3 and 4.

Abandonment of the curtailment system, whereby the fishing fleets had for several years distributed their landings over a longer period of the year, shortened the fishing season in both Areas 2 and 3. This tendency was offset to some extent by reductions in the size of the fleets, by naval restrictions on fishing in Area 3 and by a temporary reduction in the availability of halibut on some of the most productive banks in Area 2.

The reported catch of halibut on the Pacific coast in 1942 amounted to 50,386,000 pounds. Of this, 286,000 pounds were reported from Area 1, south of Willapa Harbor, Washington, 23,228,000 pounds from Area 2, between Willapa Harbor and Cape Spencer, Alaska, and 26,872,000 pounds from Area 3, between Cape Spencer and the Aleutian Islands. No fishing was done in Area 4,

which includes the Aleutian Islands region and Bering Sea. The catch in Area 2 included 527,000 pounds landed by set-line boats under permit to retain halibut caught incidentally during fishing for other species after closure of the area to halibut fishing.

Scientific investigations, necessary for the fulfilment of the purposes of the treaty, were continued by the Commission's staff as well as wartime conditions would permit. Current biological and statistical data, which show the changes occurring in the stocks of halibut as a result of regulation and provide a sound basis for the rational control of the fishery, were collected and analysed. The collection of biological data at sea made vessel operations necessary.

The abundance of halibut, as indicated by the catch per unit of fishing effort, showed improvement during the year. Analysis of fishing records revealed that the catch per unit of fishing gear in Area 3 was 131 pounds, 8 per cent greater than in the preceding year and 103 per cent greater than in 1930. In Area 2, the catch per unit of gear was 64 pounds, 5 per cent greater than in 1941 and 83 per cent above the 1930 level but still below the level of 1938.

Marked changes in halibut fishing gear, resulting from wartime shortages of cordage fibres that were previously used, made necessary an investigation of the relative efficiency of present and pre-war units of gear. Preliminary results of this work have been used to standardize the 1942 unit of gear. However, until the investigation is completed, 1942 values for the catch per unit of gear cannot be regarded as final.

No new tagging experiments were undertaken but a number of tagged halibut were recovered from experiments of previous years. The migrations of these fish were in agreement with those of fish recovered from the same experiments in earlier years.

Study of the changes taking place in the composition of the stocks of adult halibut as a result of regulation was continued by means of measurement of the fish in the commercial catches. Approximately 24,000 halibut were measured from 29 representative Area 2 trips and 8,000 from twelve Area 3 trips landed at Seattle. Materials for the study of changes in the age composition of the stocks were secured from the same trips.

Analysis of the market measurements corroborated previous findings that halibut of spawning size are now very abundant in Area 3 but are still present in only moderate numbers in Area 2. Measurements of Area 2 landings failed for the fifth consecutive year to produce conclusive evidence of any significant increase in the numbers of fish of spawning size. They did, however, show that small immature fish were entering the fishery in greater abundance than in other recent years. Such an increase in the number of small fish was expected, inasmuch as the production of spawn was unusually great in the winter of 1936-37 and the young resulting from each spawning first appear in the fishery in appreciable numbers during their sixth year of life.

Investigation of the changes occurring in the age-composition of the commercial stocks, which was begun in 1941 to determine the exact time when changes in the stocks originated and thus the events that caused them, was continued in so far as other duties permitted. Several years of work, on the present limited basis, will be required to accumulate data on a sufficient number of years to serve the purpose of the work.

Quantitative investigations of the production of spawn, the best available method of determining changes in spawning conditions as soon as they occur, were again undertaken in Area 2. A vessel was chartered and operated for the purpose, from December 2, 1941, to February 28, 1942, throughout the important spawning area in the vicinity of Cape St. James, British Columbia. During the period of operations, 344 quantitative net hauls were made at 131 stations to determine the abundance of eggs and larvae. Hydrographic samples were also taken at fifteen stations to determine the water conditions prevailing

where the eggs and larvae were found. Similar work was begun in late December of 1942.

The materials collected during the winter of 1941-42 for the determination of the production of spawn were less adequate than usual, due to a period of bad weather which prevented the taking of net hauls for a two-week period at the height of the spawning season. This rendered the comparison of results with those of previous years more difficult and less reliable. The results obtained early and late in the spawning season indicate that the production of eggs was approximately equal to that of the previous winter.

The Commission's biological and statistical investigations have demonstrated the existence of definite and understandable relationships between the intensity of fishing, the abundance of halibut and the amount of catch. They measure and explain the changes taking place in these components. They reveal that current catches are as great as can now be taken without injury to the partly-rebuilt stocks on the grounds and to the catches of the immediate future. They show that the maintenance of regulation on the present rational basis is essential to assure the maximum possible yield of halibut during the next few years and to permit the securing of that yield with the least possible expenditure of manpower and fishing equipment.

The members of the Commission were: Messrs. L. W. Patmore, Victoria, B.C., and A. J. Whitmore, Department of Fisheries, Ottawa, Ont., representing Canada, and E. W. Allen, Seattle, Washington, and C. E. Jackson, United States Fish and Wildlife Service, Washington, D.C., representing the United States. Mr. Allen was the Chairman and Mr. Patmore the Secretary during 1942.

INTERNATIONAL PACIFIC SALMON FISHERIES COMMISSION

The season of 1942 was the fifth since the work of the Commission began in the fall of 1937. Until the completion of the eighth year, the Commission will be concerned with investigation, with removal of obstructions, and with the improvement of propagation.

The Commission met during 1942 on April 14 to 16, in Vancouver; August 31 to September 2, in Vancouver; and December 7, in Victoria. No changes in officers or membership were made during the year. The Chairman was Tom Reid, M.P., of New Westminster, B.C.; the members, Charles E. Jackson, of the United States Fish and Wildlife Service; A. J. Whitmore, of the Department of Fisheries, Ottawa; B. M. Brennan, of Seattle, Washington; A. L. Hager, of Vancouver; and Edward W. Allen of Seattle, Secretary.

During 1942 it became evident that the Commission must devote increased attention to three phases of its work. Collection of more complete statistics will be required for purposes of dividing the catch and of properly framing regulations. Rehabilitation of the depleted sections of the Fraser, such as the Quesnel district, will be the next major problem facing the Commission, other than regulation. A third, temporarily delayed by the urgency of the Hell's Gate obstruction, is the more complete and scientific evaluation of the spawning populations. This must be done at the earliest possible time, in order that a standardized and accurate record of the effects of regulation will be at hand.

During 1942 the blockade at Hell's Gate was again the centre of interest. It will be remembered that there was a heavy mortality in 1941, during water levels at which the fish could not pass. The dangerous levels lasted from the last days of July to nearly the end of the period of sockeye migration. A brief opening about the first of September allowed the major part of the escapement for the season to the upriver spawning grounds, an escapement which in itself was considerable to certain districts.

It had long been known that sockeye were delayed in passage at various points in the river, and especially at Hell's Gate. The Commission itself had

in 1938, 1939, and 1940 good evidence of this delay. But there was no evidence that the fish did not later proceed. There was lacking necessary proof of the mortality which resulted. In 1941 this proof was supplied in conclusive fashion by concentration of the Commission's work upon an adequate tagging program, with a new technique of interpretation of the results. It was successful in proving the very high percentage of deaths among the delayed fish and in showing the manner in which it affected the individual races which passed Hell's Gate at the time of blockade.

Attention was immediately given to remedial measures. In fact, before the investigation was complete, steps had been taken to put them in effect. Delay in doing so could be expected because of the magnitude of the engineering problem involved in any permanent alteration of the reach or of the conditions of passage. To care for the immediate future as well as possible, during this delay, it was decided to construct a small fish pass through the rock and around the obstruction on the east bank. The entrances to this could not be placed to take care of all parts of the blocked levels of the river, nor could it be made of sufficient size to care for all levels and any anticipated number of fish. Hence it is not regarded as more than a partial solution at best.

A report was submitted to the two governments recommending its construction. But even with this approval funds could not be secured in time for construction during the low water immediately following the run of 1941. It was, however, begun as the water level fell in the fall of 1942, and it was completed in that year, ready for the run of 1943.

The run of 1942 was in large part bound for the Shuswap district and was the largest of recent years, a recurrence of the four-year cycle which has grown up there since the 30's. It seemed imperative to provide some means of salvaging this run in case the river was blocked during its progress past Hell's Gate. The temporary rock cut could not be finished in time. In case a prolonged blockade developed, great mortality might be caused. Accordingly, the Commission considered methods of salvaging eggs from fish held below the block and of transporting fish over it. It was finally decided to capture the fish in the eddy immediately below the obstruction on the east bank. A large sized brail net was operated by a derrick, the fish were dropped into a tank and flushed down a flume opening 750 feet upstream. It was a procedure which could be very useful in case the sockeye accumulated in dense masses, but might not be so if they were sparse in number. Certainly but a small fraction of the total run could be handled. This equipment was ready for use before the heavy run of the year commenced.

At the same time another extensive tagging experiment was carried out, over 8,000 tags being placed. This was to test further the upper limits of the obstruction, and to determine any possible difference between opposite sides of the river which might indicate the necessity of remedial action on both sides.

It was also to provide a record of the mortality caused, especially if the period of the block happened to be short. It was obvious that in 1941 the period was exceptionally long, and the question might be raised fairly as to whether that was not a most unusual year. A test to see if mortalities were caused by an average or short period of dangerous river levels was badly needed. With the technique developed this could be done.

Fortunately both for the run of fish and for the desired test, the river fell rapidly through the levels at which the block was present. It remained but 28 days between 40 and 25 feet on the gauge, and was below the dangerous levels by September 1. The great Shuswap run of fish went through without delay, but bulk subsequent to September 15, and a run to the Stellako district passed in early September. The fishing equipment and flume, while ready for use before the heavy run commenced, was used very little and its efficiency remains to be determined by use.

In consequence, in 1942 the mortalities, during a short period of block, were determined, a large uninterrupted run of one main locality was observed,

and the conditions to be remedied were given the necessary more detailed study.

The evidence now at hand must be analysed in detail, but thus far it is indicated that there was a heavy mortality rate in the small run passing at the time the block was affected. This increased with the length of time the individual was delayed. The delay began considerably before the 40-foot level was reached, and the mortality was graduated in effect, not abruptly greater after twelve days, or thereabouts, of delay. Full analysis must be awaited as to these points before they can be stated precisely without reservation.

The tagged fish retaken at Adams and Little rivers indicated that the early fish in a run had a slower time of migration and a longer period on the grounds before death than the later fish. Indeed, at the end of the run it was difficult to see how any delay could be endured without bringing death before reaching the grounds or before spawning. If so, it can be expected that the results of delay will vary, not only with the time of year the block occurs but with the race which happens to be passing and with the early or late fish of the same race. It may, indeed, be worthy of investigation to see whether the early running upriver races are not more seriously affected than the late runs, because the block usually occurs in mid-season and would affect the latter part in one case and the early part in the other, with corresponding difference in effect. During the year, detailed surveys were made of Hell's Gate reach, and a model on the scale of one to fifty was constructed at the University of Washington, where the nearest available facilities for such work were found. The model was constructed and tests run under the supervision of Mr. Milo C. Bell, the Commission's chief engineer, by Professors E. S. Pretious, of the University of British Columbia, and Walter Hiltner, of the University of Washington, with the advice and assistance of Professor C. W. Harris, of the latter institution.

As a result of the tests run on this model, and of detailed studies made otherwise, it is hoped to make recommendations to the two governments, Canadian and the United States, for complete and permanent remedies.

Tagging was also continued at Sooke, on the southern end of Vancouver Island. A total of 1,802 sockeye were tagged, with a recovery of 41 per cent. The results for the five years this has been done follow:—

Year	Number Tagged	Number Recovered	Per cent Recovered
1938.....	980	431	44
1939.....	1,051	547	51
1940.....	930	417	45
1941.....	849	485	58
1942.....	1,802	735	41

It is interesting to observe the alternation of low returns in even years with high in odd years. The odd years are those in which pink salmon are abundant.

The program of the Commission was carried on as usual. The enumeration of migrants, both adults and young, was continued at Cultus lake. Statistics of the commercial catch were gathered by cannery observers who collected biological data. Estimations of escapement were made by stream observers in addition to their duties of recovering tags, etc. Studies of the Quenel district were begun to determine methods of rehabilitation to be undertaken as soon as possible.

The Commission is now faced with the preparation of scientific reports on the great mass of data already in hand. This must be given further attention at the earliest possible moment, as work additional to the present program of the scientific staff.

D. B. FINN,
Deputy Minister of Fisheries.

APPENDIX No. 1

**REPORT OF COL. A. L. BARRY, CHIEF SUPERVISOR OF FISHERIES,
EASTERN DIVISION, FOR THE CALENDAR YEAR 1942***

Total landings of fish and shellfish for the division during 1942 were smaller than in 1941 by over 20,000,000 pounds but there was an increase of more than \$3,000,000 in total landed value. Catches for Nova Scotia and New Brunswick decreased while those of Prince Edward Island and the Magdalen Islands increased.

The total quantity of fish and shellfish landed was approximately 475,022,000 pounds, with a landed value of \$14,134,000, as compared with about 496,000,000 pounds, with a landed value of \$10,935,000 in 1941.

THE COD FISHERY

Cod landings decreased by over 9,000,000 pounds, as compared with the previous year. A decrease of over 10,000,000 pounds occurred in Nova Scotia with a further decrease of more than 700,000 pounds in Prince Edward Island. The decreases were offset in some measure but not greatly by increases in New Brunswick and the Magdalen Islands.

The total quantity of codfish landed was 147,415,000 pounds, with a landed value of \$4,190,000, as compared with 157,215,000 pounds and \$3,115,000 in 1941.

THE LOBSTER FISHERY

There was an increase of 119,000 pounds in the catch of lobsters, with an increase of \$966,000 in landed value. The Nova Scotia catch decreased by 1,226,000 pounds but this was largely offset by an increase of 1,068,000 pounds in New Brunswick. In Prince Edward Island there was an increase of 450,000 pounds but the Magdalen Island catch decreased by 173,000 pounds. (Lobster catch, cannery pack and shipments in shell are shown, by provinces, in the Deputy Minister's fisheries review for 1942 on an earlier page.)

THE HADDOCK FISHERY

A decrease of about 2,000,000 pounds occurred in the haddock catch. In Nova Scotia, where the bulk of the landings were made, the decrease was over 2,490,000 pounds. Landings in Cape Breton were much the same as last year. In the eastern mainland landings were down at Halifax but were up considerably in western Guysboro and western Halifax counties. The catch in the western mainland decreased by slightly over 2,000,000 pounds.

THE SARDINE FISHERY

The sardine fishery, which is virtually confined to the Bay of Fundy section of New Brunswick, shows a decrease of approximately 22,000,000 pounds in catch but an increase of about \$35,000 in landed value. All told, 68,089,000 pounds were taken with a value of \$959,700 to the fishermen, as compared with 86,673,000 pounds and a landed value of \$924,600 in 1941. The pack of canned sardines during the year amounted to 453,243 cases.

* Catch and value figures for 1942 contained in this report are for the most part approximate only. They were compiled before the final checking of statistical reports for the year had been completed. Final official figures will be found in Fisheries Statistics of Canada, 1942.

Nova Scotia

Total Nova Scotia catch decreased by approximately 11,000,000 pounds. Returns to the fishermen, however, increased by nearly \$2,000,000. Cod landings were lower by over 10,000,000 pounds. In the Cape Breton Island section, landings were 8,000,000 pounds above those of 1941. This increase was due in part to the fact that twenty-five small Newfoundland vessels operated throughout the season off Glace Bay, North Sydney, and Ingonish. The catch in the eastern mainland decreased by approximately 2,000,000 pounds and in the western mainland by over 17,000,000 pounds. The largest single decrease occurred in the cod fishery, where the landings were about 10,000,000 pounds below those of the previous year. Reduction occurred in the lobster, haddock, mackerel, scallop, hake, halibut, and pollock fisheries. Landings of swordfish and herring increased.

The following table, using round figures in most cases, gives a statement of the total catch, landed and marketed values for the province as well as similar information concerning the principal varieties.

1942

Total quantity of all fish landed.....	255,128,100 pounds
Total landed value.....	\$ 8,874,850
Total marketed value.....	15,297,000

	Pounds	Landed Value	Marketed Value
		\$	\$
Cod.....	121,739,800	3,552,000	6,711,300
Lobsters.....	12,847,100	2,039,950	2,451,850
Haddock.....	25,285,500	912,200	1,625,000
Mackerel.....	19,714,600	501,400	864,600
Swordfish.....	1,933,500	445,900	519,800
Herring.....	36,682,400	341,540	984,150
Scallops (gallons).....	63,570	214,910	232,700
Hake.....	10,127,500	172,400	253,800
Halibut.....	1,055,400	149,500	214,700
Pollock.....	7,820,000	132,710	253,300

New Brunswick

Total landings for New Brunswick, including those from inland waters, decreased by about 15,500,000 pounds, compared with 1941 production, due, mainly to a decrease of approximately 23,000,000 pounds in the catch of sardines. The largest single increase occurred in the herring fishery—4,300,000 pounds greater than in 1941.

The commercial freshwater catch was about 1,273,000 pounds with a value of \$28,600.

The following table shows the total catch and landed and marketed value of the fish taken in New Brunswick during the year, and gives similar information as to the production of principal varieties, using round figures in most cases:

1942

Total quantity of all fish landed.....	161,307,300 pounds
Total landed value.....	\$ 3,649,300
Total marketed value.....	7,088,300

DEPARTMENT OF FISHERIES

	Pounds	Landed Value	Marketed Value
		\$	\$
Sardines.....	63,313,600	955,300	2,138,800
Lobsters.....	6,953,000	978,200	1,565,000
Herring.....	46,052,500	351,800	1,095,300
Cod.....	13,782,400	348,300	574,600
Smelts.....	5,184,600	339,300	524,200
Salmon.....	997,400	191,000	200,900
Clams.....	7,043,300	70,400	182,250
Hake.....	5,006,500	94,400	141,000
Oysters.....	2,786,200	79,250	120,200
Alewives.....	3,410,200	29,300	85,700
Haddock.....	908,000	48,500	54,300
Shad.....	1,454,200	39,400	49,500

Prince Edward Island

There was an increase of approximately 4,300,000 pounds in the total quantity of fish and shellfish taken in Prince Edward Island, with an increase of about \$390,000 in landed value. The lobster catch increased by 450,000 pounds and landed value by \$225,000. There was a large increase in the hake catch; the total landings of this variety increased by 4,600,000 pounds with an increase of \$130,900 in value to the fishermen. Catches of cod, mackerel, herring and smelts decreased while the catch of oysters increased, as compared with 1941.

Herein is shown, in round figures, the total catch, landed and marketed values of all fish and shellfish taken during the year, as well as similar information concerning the principal varieties:

1942

Total quantity of all fish landed.....	29,245,400 pounds
Total landed value.....	\$ 1,148,400
Total marketed value.....	1,639,500

	Pounds	Landed Value	Marketed Value
		\$	\$
Lobsters.....	6,445,400	694,800	837,300
Hake.....	8,615,000	167,800	291,500
Cod.....	4,057,200	94,100	146,400
Oysters.....	1,471,800	52,500	68,300
Mackerel.....	1,638,000	44,000	81,400
Herring.....	4,492,500	38,300	61,100
Smelts.....	558,400	25,900	42,300

Magdalen Islands

The Magdalen Islands fisheries, compared with 1941, show an increase of slightly over 3,000,000 pounds in catch. Cod and herring landings were both more than 1,000,000 pounds above the figures for the previous year. The catch of mackerel increased by about 420,000 pounds. Decreased catches occurred in the lobster and smelt fisheries.

The following table shows the total catch, landed and marketed values of all fish and shellfish during the year, as well as similar information concerning the principal varieties.

1942

Total quantity of all fish landed.....	29,341,300 pounds
Total landed value.....	\$ 540,875
Total marketed value.....	978,494

	Pounds	Landed Value	Marketed Value
		\$	\$
Mackerel.....	7,271,500	155,462	296,593
Cod.....	7,836,100	196,142	241,452
Lobsters.....	1,580,800	155,573	200,357
Herring.....	11,990,500	22,595	189,625
Smelts.....	15,500	1,385	1,570

SPORT FISHING

Nova Scotia

In Cape Breton salmon angling during the year was not as good as in 1941 but on the eastern mainland the number of fish taken equalled that of last year. In the western mainland salmon angling generally was poor, although good fishing was reported on the Medway and Mersey rivers. Decreased catches were due in part to the fact that there were fewer anglers. Trout fishing was fairly good throughout the season with average catches being taken.

New Brunswick

In New Brunswick salmon angling conditions were unsatisfactory, as compared with those of last year. Low water prevailed during July, August and September, resulting in decreased catches. During the late part of October river conditions improved and fairly large numbers of salmon were able to reach the spawning grounds. Trout fishing declined in both sections of the province due to reduction in the number of anglers, low water conditions and a shortage of tires and gasoline.

Prince Edward Island

Trout fishing generally was fairly good, particularly during the first part of the season. In Prince County fishing was better than in the preceding year and good catches were made in the streams, brooks and ponds. The same was also true of Kings County. In Queens County fishing was good during the early part of the season but very poor from then on. In each of the three counties spawning conditions were satisfactory and large numbers of trout were observed in the spawning areas.

FISHERIES PATROL SERVICE

Nova Scotia.—In the Cape Breton island section the usual patrol was carried out in lobster fishing district 6A with satisfactory results. Along the eastern mainland patrol was carried out by the department-owned boat *A. Halkett* assisted by Patrol Boat No. 666. In the western sections patrol was carried out by the department-owned boats *Capelin* and *Gilbert*, assisted by a chartered boat in the Yarmouth area.

New Brunswick.—In the Bay of Fundy section the Department's boats, *Thresher* and *Gannet Rock II* were again employed throughout the year. In the Northumberland Strait section a fleet of four chartered boats was engaged. These were on duty from the last week of April until the end of November.

Prince Edward Island.—In Prince Edward Island six patrol boats were engaged. One of these was the department-owned *Capitol* and the others were chartered for duties in the several sections of the island.

Generally speaking, the patrol services throughout the division gave effective protection during the fishing seasons. The boats were primarily engaged in the protection of the lobster fishery with attention being given to the salmon, oyster, smelt, and other fisheries as required.

FISH INSPECTION

Inspection was carried out of such cured fish as are required to be inspected under the Fish Inspection Act and Regulations.

Boneless fish inspection, which is not compulsory, has been in effect for the second year and it was noticeable that inspection of this product was nearly double that of the previous year. Requests have been received from organized groups of fishermen that this inspection be compulsory and it is proposed to require compulsory inspection during 1943.

Compulsory grading and inspection of oysters in shell has been effective for the past three years and it is significant of its result that in 1942 there was only one complaint from the Montreal market. Grading and inspection have greatly increased returns to fishermen and dealers and satisfaction to the consuming public.

Grading and inspection of frozen smelts, now effective all over the Maritimes, has resulted in the maintenance of a steady price level in the United States markets and all dealers, many of whom opposed inspection at its inception, now strongly support it.

Throughout the canning season fishery inspectors were required to procure samples of different packs and forward them to the Canned Fish Inspection Laboratory at Halifax for examination. When found, faulty technique in canning was called to the attention of the packers concerned, with the result that the canners generally are in a position to put up a more uniform and better product during 1943, when a large pack of different varieties of fish is anticipated. Slightly more than 211,200 cases of sardines and herring in tomato sauce were inspected for the British Ministry of Food, and practically all of them were found of "A" quality.

EDUCATIONAL WORK

The usual adult education program was carried out among co-operative groups by the staff of St. Francis Xavier University, acting for the Department. In addition, seven instructors, trained in fish curing and sanitation, worked throughout the division during the summer and fall, giving instruction particularly, though, of course, not entirely, in the preparing of boneless fish. This service was open to both dealers and fishermen's groups.

ILLEGAL FISHING

During the year illegal fishing was at a minimum. Close co-operation between the inspectors, patrol boat men, and guardians was maintained, but owing to several wartime factors fewer men tended to engage in illegal fishing.

REDUCTION OF FISH WASTE AND COARSE FISH

During the year seventeen firms in the division produced fish meal and oil. Of these twelve operated in Nova Scotia, four on the Bay of Fundy shore of New Brunswick, and one on the New Brunswick north shore.

LOSS OF LIFE AND FISHING GEAR

The loss of life of seven commercial fishermen during the year is regretted. Four were from Nova Scotia and three from New Brunswick. In addition, three men lost their lives by drowning while angling for sport fish in New Brunswick. Loss of fishing gear and damage to gear during the year represented approximately \$165,000.

FISHING FLEETS

In Cape Breton Island the fishing fleet continued to show a decrease and although there was an apparent increase of eight in the number of vessels, due to the registering of larger sized boats, there was a decrease of 328 in the number of boats, as compared with 1941. Fewer vessels landed at Halifax and Canso during the year. The Lunenburg fleet made its regular trips to the banks but landings made were far below those of 1941.

In New Brunswick the cod fishery fleet was about the same in number as last year. The salmon drift-net fleet was reduced from 146 boats and vessels to 124.

CONCLUSION

For the first time since the last war fish prices are commensurate with the cost of production and a decent standard of living for the fishermen. Fishermen are contented but the lot of the dealer is not so happy since, apart from trouble due to war-time shipping regulations, he has had to face the problem of shortage of plant labour and materials, particularly barrels and shooks. The plant labour problem was serious and was reflected in the lowering of the quality of fresh fish since vessel cargoes often had to be held too long at the dock before being unloaded and processed.

The Chief Supervisor is pleased to report on the friendly collaboration he has received from the trade and from his colleagues in the division, including the Fisheries Research Board, and the close support of departmental officials at Ottawa, in meeting and solving the numerous problems arising as a result of the war and never met in peace-time administration.

APPENDIX No. 2

**ANNUAL REPORT OF CHIEF SUPERVISOR OF FISHERIES, MAJOR J. A.
MOTHERWELL, WESTERN DIVISION (BRITISH COLUMBIA),
FOR 1942**

Due to the abnormal conditions prevailing at this time, which resulted in unusually high prices, practically all branches of the fishing industry in British Columbia enjoyed a profitable year during 1942.

SALMON

The outstanding factor in the way of salmon production during the year 1942 was the unusually large pack of sockeye, the result of the exceptionally heavy runs to the Adams River, Shuswap, and Chilco Lake areas of the Fraser River watershed.

The pack of all varieties of salmon during the year reached a total of 1,811,560½ cases. This compares with 1,764,221 cases, the average of the years 1938 to 1942. The average packs since 1923 are given in the following statement:

1923-1927	1,647,090 cases
1928-1932	1,484,861 "
1933-1937	1,553,444 "
1938-1942	1,764,221 "

SOCKEYE

The canned sockeye total of 666,571½ cases is the largest since the last big fourth-year Fraser River run of 1913, and exceeded the average pack of the last five years by 225,449½ cases, or 51 per cent. The average packs since 1923 are given in the following statement:

1923-1927	348,383 cases
1928-1932	307,669 "
1933-1937	345,446 "
1938-1942	441,122 "

Naas River Area.—The total of 24,461 cases compares with a total of 21,746 cases in 1938 and 24,425 cases in 1939, the two brood years.

Skeena River Area.—No large pack was expected in this area during the year, as the years 1937 and 1938 were two poor cycles. The total, of 29,976 cases, compares with 41,023 cases in 1937 and 46,988 in 1938. The 1942 total, of course, is very disappointing, particularly in view of the fact that the upper fishing boundary on the Skeena River is now so far down towards the mouth of the stream. It is interesting to note, however, that in 1937 there were 850 salmon gillnet boats operating on the Skeena and in the following years 1,049, as compared with only 775 in 1942. This is a decrease of 175 boats, or a percentage of 18.42, compared with the average number during the two brood years.

Larger numbers of sockeye appeared on the spawning grounds of the Lakelse Lake district than usual, but the same conditions did not obtain in the Babine Lake area. The year's pack was the smallest since 1933, when the total reached only 27,693 cases.

Rivers and Smiths Inlets.—The combined pack of these two areas reached a total of 95,062½ cases, compared with 108,170 cases in 1937 and 122,093 cases in 1938. The number of fishing licences, however, in 1937 was 1,875 and in 1938 it was 2,261, as compared with 1,505 in 1942. The 1942 escapement was good.

Fraser River Area.—The total of 418,491 cases was the largest since 1913, the last year of the big fourth-year run, which had totalled 684,596 cases, and, compared with that of the brood year of 1938, which totalled 169,430 cases, shows an increase of 147 per cent. Statement No. 12 shows that the pack of sockeye taken on the United States side of the international boundary totalled 263,458 cases, the largest since 1934. Practically all of these sockeye are headed for the Fraser River. Notwithstanding unusually large commercial catches the escapement was excellent.

It will also be noted from Statement No. 12 that the pack from the run proceeding to the Fraser River and intercepted at the traps in Juan de Fuca Straits, Puget Sound waters, the Gulf of Georgia, and the Fraser River, totals 690,437 cases, comparing with a total of 312,387 cases for the cycle year, or an increase of 112 per cent. This is also the largest pack, since 1913, taken from the runs of sockeye heading for the Fraser and fished in the several areas above mentioned.

COHOES

The total of 187,873½ cases was smaller than expected, although it compared favourably with the output in 1939 when 196,887 cases were packed. As in 1941, export of this variety was prohibited. The pack since 1928, arranged in three-year periods, was as follows:

1928-1930	157,814 cases
1931-1933	124,878 "
1934-1936	208,130 "
1937-1939	194,855 "
1940-1942	263,274 "

PINKS

This year's pack of 270,622½ cases, whilst showing an increase over the total for the brood year of 1940, of 56,711½ cases, or 27 per cent, was not satisfactory. Good catches were made in the Massett area but such areas as Lowe Inlet, Butedale, and Bella Bella still show signs of insufficient runs, due largely to dry seasons which have made the numerous small streams inaccessible to the salmon when they arrived. These areas from now on will be given particular attention. The pack of pinks, shown in two year periods, since 1929, is given below:

1929-1930	794,953 cases
1931-1932	215,355 "
1933-1934	483,961 "
1935-1936	553,249 "
1937-1938	493,226 "
1939-1940	417,253 "
1941-1942	349,194 "

CHUMS

Whilst the total of 633,834 cases does not compare favourably with that of the preceding year, when 920,470 cases were obtained, yet this year's production is a good average. In the past four years the average was 646,083 cases. The packs since 1923, stated in four-year averages, follow:

1923-1926	Cases
1927-1930	574,604
1931-1934	562,865
1935-1938	292,393
1939-1942	499,126
	646,083

SALMON—GENERAL

The number of sockeye salmon required to fill a case of forty-eight one pound talls, in the several gill-net areas during the season 1942 was as follows:

Fraser River.....	12.00
Skeena River.....	12.60
Naas River.....	11.25
Rivers Inlet.....	11.90
Bella Coola.....	15.50
Butedale.....	13.40

INSPECTION OF CANNED SALMON

The following are the detailed results of the year's inspection of canned salmon at the laboratory maintained by the department in Vancouver:

Number of inspections made.....	2,282
Total number of cases inspected.....	1,791,444½
Total number of cases eligible for certificates.....	1,718,571½
Total number of cases below certificate standard.....	72,873

DETAILS OF CANNED SALMON INSPECTION ACCORDING TO SPECIES

Species	Number of Cases Inspected	Number of Cases Below Certificate Standard	Number of Cases Eligible for Certificates
Sockeye.....	659,520	44,633	614,887
Springs.....	26,776	259	26,517
Steelheads.....	3,819	.....	3,819
Bluebacks.....	23,249½	156	23,093½
Coho.....	185,097	1,156	183,941
Pinks.....	266,712	6,118½	260,593½
Chums.....	626,271	20,550½	605,720½
	1,791,444½	72,873	1,718,571½

PARTICULARS OF NON-CERTIFIED SALMON ACCORDING TO SPECIES

Species	Below Grade B	Grade B	Tips and Tails	Minced Flakes etc.	Totals
Sockeye.....	126	41,045½	2,702½	759	44,633
Springs.....	.....	256	.....	3	259
Steelhead.....	.....	.....	.....	.....	.....
Bluebacks.....	.....	87	69	.....	156
Coho.....	337	430	378	11	1,156
Pinks.....	.....	5,841½	277	.....	6,118½
Chums.....	840	19,375	303	32½	20,550½
	1,303	67,035	3,729½	805½	72,873

The report of F. Charnley, Chief Chemist, covering the year's operations at the laboratory will be found as Appendix No.....

The laboratory inspection fees collected at the rate of one-half cent per case amounted to:

Canned salmon.....	\$ 9,493 56
Canned herring.....	6,030 95
	<u>\$ 15,524 51</u>

SALMON FOR UNITED KINGDOM

This year the whole of the British Columbia pack of canned salmon was made available to the British Government, apart from approximately 75,000 cases reserved for the purposes of the Canadian Red Cross and the Armed Services. As was the case in the preceding year, the necessary negotiations were conducted by the Department of Fisheries with the salmon industry in the province, and the actual dispatch of the salmon to overseas destinations was completed with the assistance of the two liaison officers in Vancouver, appointed by the British Ministry of Food.

The prices paid for the 1942 pack were as follows:

	1 lb. Tall cans— 48 cans to the case	$\frac{1}{2}$ lb. Flat cans— 96 cans to the case	$\frac{1}{4}$ lb. Flat cans— 96 cans to the case
	\$ cts.	\$ cts.	\$ cts.
<i>Grade A Salmon</i>			
Grade I (sockeye).....	16 25	17 50	10 50
Grade II (coho, redspring, blueback, and steelhead).....	11 50	12 75	8 12 $\frac{1}{2}$
Grade III (pink and chum).....	6 25	7 50	5 00
<i>Grade B, Tips and Tails, Minced or Flaked Salmon</i>			
Grade I (sockeye).....	12 75	14 00	8 75
Grade II (coho, redspring, blueback and steelhead).....	10 00	11 25	7 37 $\frac{1}{2}$
Grade II (pink and chum).....	5 50	6 75	4 62 $\frac{1}{2}$

SALMON TAKEN BY INDIANS OF THE PROVINCE FOR PURPOSES OF THEIR OWN FOOD SUPPLIES, UNDER FREE PERMIT

Indians, for their own food purposes, under special permits granted them by the department, took the following quantities of the several varieties of salmon:

	Sockeye	Springs	Coho	Pinks	Chums	Steel-heads	Total
	(fish)	(fish)	(fish)	(fish)	(fish)	(fish)	(fish)
District No. 1.....	43,130	10,853	8,491	.....	6,650	2,845	71,969
District No. 2.....	100,280	6,193	24,075	8,220	25,579	2,661	167,008
District No. 3.....	13,530	3,280	12,330	2,500	98,800	.....	130,440
Totals.....	156,940	20,326	44,896	10,720	131,029	5,506	369,417

SALVAGING OF SALMON FRY

One of the duties of the fishery officers in the field is to watch carefully all salmon streams during the period of low water, in order that salmon fry which may have become stranded may be saved. During the year, by means of transferring from shallow pools to deep water, the following quantities of the several varieties were saved:

—	Method	Springs	Steelheads	Cohoes	Chums	Total
<i>District No. 1—</i>						
Squamish.....	Netting....	4,400		4,850		9,250
	Ditching....	1,300		3,150		4,450
Chilliwack.....	Netting....			1,250	3,000	4,250
	Ditching....			4,950		4,950
Total—District No. 1..		5,700		14,200	3,000	22,900
<i>District No. 3—</i>						
Victoria.....	Netting....		2,475	6,050	13,000	21,525
	Ditching....				22,000	22,000
Cowichan.....	Netting....			206,250	36,400	242,650
	Ditching....			945,000	42,000	987,000
Ladysmith.....	Ditching....			15,000		15,000
Alberni.....	Netting....		1,100	67,000		68,100
Total—District No. 3..			3,575	1,239,300	113,400	1,356,275
Total for Province....		5,700	3,575	1,253,500	116,400	1,379,175

HALIBUT

The total landing at British Columbia ports, including those by United States vessels, amounted to 243,915 hundredweights, compared with 229,658 hundredweights in the preceding year. A number of the most efficient halibut boats had been requisitioned for certain work connected with national purposes but the attractive prices being paid for halibut tended to stimulate production effort.

Following are figures showing the landings in different centres in the province in recent years:

Year	Vancouver and New Westminster	Prince Rupert	Butedale- Namu Area	District No. 3	Totals
	cwts.	cwts.	cwts.	cwts.	cwts.
1930.....	11,387	293,617	978	2,814	308,796
1931.....	8,498	167,757	3,627	2,123	182,005
1932.....	11,883	148,615	6,677	1,672	168,847
1933.....	13,436	144,065	10,431	2,440	170,372
1934.....	16,113	150,476	13,297	2,716	182,602
1935.....	22,351	129,586	15,713	3,493	171,143
1936.....	20,777	131,830	11,522	3,992	168,121
1937.....	23,334	147,638	12,676	3,777	187,425
1938.....	28,155	141,691	17,776	5,866	193,488
1939.....	30,225	173,857	18,651	4,455	227,188
1940.....	26,010	185,921	23,157	3,955	239,043
1941.....	22,057	166,513	30,946	10,142	229,658
1942.....	30,547	180,789	21,638	10,941	243,915

An interesting development in the halibut fishery as a result of war conditions has been the removal of the headquarters of a number of the boats from Prince Rupert to Vancouver. It has been found that the congestion on the waterfront in the former city is so great as to crowd out some of the halibut vessels.

FISH LIVERS

By Statement No. 17 it will be observed that the fishermen shared in a total of \$1,958,745 as a result of the sale of fish livers landed during the year.

CLAMS

In the clam industry the total of 17,808 cases packed during the year was well above the average production in size. This is particularly gratifying in view of the fact that digging operations were curtailed, owing to the prohibition of the marketing of clams in certain sections of the province, at the instance of the provincial health authorities when the product of some clam beds was found to be unsatisfactory from the food standpoint. Pending the conclusion of an investigation by the federal Department of Pensions and National Health it was considered desirable to curtail the fishing.

The quantities of clams marketed during the years 1934 to 1942 has been as follows:

Year	Marketed fresh (cwts.)	Canned (cases)
1934	6,332	5,815
1935	15,716	10,209
1936	26,530	12,579
1937	27,018	12,587
1938	42,169	22,155
1939	21,601	5,431
1940	20,785	7,151
1941	25,402	12,783
1942	8,278	17,808

HERRING FOR UNITED KINGDOM

This year that portion of the 1942-1943 canned herring pack of the province, contained in oval-shaped cans, apart from Grade B. fish, and apart from a specified maximum of 100,000 cases (48-pound cases) in one-pound tall cans, was reserved for the purposes of the United Kingdom, under conditions practically similar to those obtaining the previous year, save as to prices, which in the later agreement are as follows:

Grade A.....	1-pound oval cans.....	\$4.80
	½-pound oval cans.....	3.95
	1-pound tall cans.....	4.22

The indications were, however, that the pack available to the United Kingdom from operations of the 1942-43 season would be somewhat less than that of the preceding season.

At the end of the year a total of 1,540,918 cases had been packed, as set out in the following statement:

	District No. 1	District No. 2	District No. 3	Total	Green Tons
Catch.....cwts.	4,698	658,035	1,662,094	2,324,827	116,242
Production—					
Marketed fresh.....cwts.	7,975	7	6,774	14,756	737
Canned.....cases	1,193,694	211,410	135,814	1,540,918	61,636
Kipperd.....cwts.	2,591	16	42	2,577	258
Bloaterd.....cwts.	2	5	.....	7	1
Pickled.....bbls.	105	.....	2,256	2,361	590
Used as bait.....bbls.	15,998	33,782	6,609	56,389	6,539
Herring meal.....tons	2,643	4,513	3,742	10,898	.....
Herring oil.....Imp. gals.	194,011	224,806	224,760	643,577	-46,481

PILCHARDS

Canned pilchard output was 46,451 cases, compared with 58,038 cases in the preceding year. The oil content of pilchards caught in 1942 was considerably less than that of the catch of 1941.

DEPARTMENT OF FISHERIES

VIOLATIONS

Particulars of the 171 prosecutions for infractions of the fishery regulations, resulting in the collection of \$23,727.63, are as follows:

	District No. 1	District No. 2	District No. 3	Totals
Prosecutions.....	52	44	75	171
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Fines.....	7,282 00	1,505 00	3,115 00	11,902 00
Sales.....	8,993 16	2,428 64	403 83	11,825 63
Total, Fines and Sales.....	16,275 16	3,933 64	3,518 83	23,727 63

JAPANESE FISHING BOATS

On the declaration of war with Japan steps were immediately taken by the federal authorities to take into custody all the fishing vessels on the British Columbia coast owned by persons of Japanese nationality or Japanese origin. These craft totalled 1,337 boats of the following types:

Vessels Classified According to Type	Per Cent of Total
68 seiners	5
120 trollers	9
860 gill-netters	64
148 packers	11
141 cod-fishers, etc.	11
<u>1,337</u>	<u>100</u>

LICENCES

Fishermen of Japanese Origin.—Out of the 1,337 boats taken over by the authorities, 887 were disposed of by the Japanese Fishing Vessels Disposal Committee to persons engaged in the fishing industry, and were employed during the year under review. Naturally, purchasers selected the boats they regarded as most efficient. It can be safely stated, therefore, that the production of fish was not materially interfered with by the taking into custody of the boats owned by the fishermen of Japanese origin.

In 1941, the last year when fishermen of Japanese origin were permitted to operate in British Columbia waters, they held 15.4 per cent of the commercial fishing licences. In that year the total number of licences issued was 13,602. In the year 1942 the total was 15,379, so that actually there was an increase of 1,700 licences, notwithstanding the elimination of the fishermen of Japanese origin.

BOAT BUILDING SUBSIDY

Early in the year it became evident that some assistance would be necessary to help the fishing industry in obtaining new boats, since some ninety fishing craft, a large percentage of them big producers, had been requisitioned by the Dominion for certain public purposes.

Under Order in Council P.C. 2798, of April 10, 1942, authority was given for the payment of a subsidy of \$165 per gross ton to assist in the private construction of fishing boats of the seiner-packer type, ranging from 70 feet to 78 feet in length, and costing between \$48,000 and \$53,000 each.

During the year, under the subsidy plan, the private construction of eleven boats was commenced, but it was found that owing to the difficulty of obtaining some of the materials entering into construction all of these could not be completed by the end of the year.

CHANGING CONDITIONS IN INDUSTRY INDUCED BY WAR

Among changes and difficulties brought about in the industry by conditions resulting from the war have been the following:

(1) The taking over by the defence services from the industry of approximately ninety boats, many of them vessels of the most efficient type from the standpoint of production of fish.

(2) The scarcity of labour all along the coast necessitated the closing of a number of canneries at outlying points and the concentration of operations at central points such as Vancouver, with resultant long hauls from the fishing grounds to the processing plants.

(3) The necessity of utilizing inexperienced labour in shore plants in a good many instances.

(4) The scarcity of vital materials such as lumber, nails, engines, etc., and the difficulty of obtaining priorities for those available retarded new building operations and repairs work.

EXPORT PERMITS

The assistance rendered by the fishery officers in British Columbia to the Department of Trade and Commerce, in the issuing of export permits was continued during the year, the total number issued being as follows:

	Vancouver Office	Inspector Scott, Victoria	Prince Rupert Office	Total
U.S.A.....	596	38	232	866
British Empire.....	41			41
Central America.....	2			2
South America.....	4			4
	643	38	232	913

GASOLINE RATIONING

At the request of the federal Oil Controller the services of fishery officers along the coast were utilized in receiving applications from commercial fishermen for gasoline permit cards and issuing cards to applicants found to be entitled to them. The number of cards so issued totalled 6,631, divided as follows as regards source of issue:

Vancouver office.....	1,370
New Westminster office.....	782
Prince Rupert office.....	1,180
Prince Rupert inspectors in the field.....	992
Nanaimo office.....	449
Nanaimo inspectors in the field.....	1,858

MINISTER'S VISIT TO BRITISH COLUMBIA

Much to the satisfaction of the fishing industry of the province, Honourable Ernest Bertrand, M.P., visited British Columbia almost immediately after his appointment as Minister of Fisheries and conducted as intensive a survey of the fishery industry as was possible in the limited time at his disposal. Portions of the province covered included the Fraser River and Vancouver and Victoria, Port Alberni, and other parts of lower Vancouver Island. Numerous representatives of the industry took advantage of the opportunity of meeting and discussing with the minister various fishery problems.

PATROL SERVICE

The number of boats utilized for the purpose of protection of the fisheries during the year totalled 111, of which 22 are departmentally owned. Because of war conditions great difficulty was again experienced in obtaining suitable boats and men.

Each year produces more evidence as to the advantage of seaplane patrol, which has not been available in recent years. Due to the increased intensity of fishing as a result of unusually high prices, fishermen take greater risks of detection, and conservation becomes more difficult. This was particularly the case during 1942, when an unusually dry summer caused many salmon streams to remain dry during a large part of the year and salmon remained at the mouths of these streams, awaiting opportunity to ascend. In the absence of air service it would require a guardian at each stream during the whole of the salmon run to supply proper protection, but in view of the great number of streams in the province, and the difficulty in wild unorganized country, where guardians would require to be placed, this form of protection is not feasible in a measure which would be adequate.

DESTRUCTION OF SEA LIONS

In an effort to curtail the depredations of sea lions, which result in injury to fishing gear, officers of the fisheries patrol service in the course of their patrols destroyed the following sea lions:

Where Destroyed	Number Destroyed
Seymour Narrows	4
Nanaimo to Nanoose Bay	119
Nanoose Bay	75
Barkley Sound	10
	<hr/> 208

SPORT FISHING

Owing to gasoline rationing sport fishing in tidal waters, particularly, was considerably curtailed. Privately owned pleasure boats could not obtain sufficient fuel to permit normal fishing operations, and, in the case of power boats for rent at the several fishing centres, the allowance was so small as to lessen sport fishing very materially.

In the tidal portion of the Fraser River large numbers of residents obtain cutthroat trout, Dolly Varden trout, salmon grilse, steelheads, and occasionally sturgeon, by still fishing. These sources of supply assist materially in providing a variety of food which is not so plentiful as previously, since all canned salmon, and most of the canned herring were requisitioned for the purpose of the United Kingdom.

In the more popular sport fishing areas, such as Cowichan, Qualicum, Comox, Campbell River, Yuclataw Rapids, and Howe Sound, spring salmon and coho salmon provided good sport, as usual, for those who were in a position to avail themselves of it.

STAFF

The following changes in the permanent staff occurred during the year:

Murdo MacLeod, Fisheries Inspector, Clayoquot area, for the past twenty years, died in December.

Fisheries Inspector A. F. Lloyd of the Cowichan area, after thirty years of service, retired under superannuation.

Fisheries Inspector R. Pilling, of the Pender Harbour area, retired after twelve years' service.

A reference to the work done in clearing obstructions from British Columbia streams during 1942 will be found in the report on the work of the department's Engineering Branch, Appendix No. 5.

STATEMENT No. 1—ANNUAL CANNED SALMON PRODUCTION IN BRITISH COLUMBIA—1933-1942

Year	Num-ber of can-neries oper-ated	Number of salmon licences issued					Packed canned									
		G.N. Troll	P.S.	D.S.	T.N.	Sockeye	Red Spring	Pink Spring	White Spring	Blue-back	Steel-head	Coho	Pink	Chum	Totals	
						cases	cases	cases	cases	cases	cases	cases	cases	cases	cases	
1933.....	49	6,113	2,880	238	31	8	258,107	12,464	1,849	5,953	21,763	1,459	137,289	532,558	293,630	1,205,072
1934.....	49	6,826	3,099	296	9	8	377,882	15,281	1,644	12,859	29,556	1,282	195,874	435,364	513,184	1,582,926
1935.....	43	6,216	3,107	293	9	8	350,444	10,187	3,114	8,619	15,319	596	216,173	514,966	409,604	1,529,022
1936.....	45	6,620	3,511	287	9	7	415,024	16,493	2,527	10,834	33,718	1,068	212,343	591,532	597,487	1,881,026
1937.....	37	6,095	3,162	291	9	5	325,774	10,963	1,788	3,420	19,236	844	113,972	585,576	447,602	1,509,175
1938.....	38	7,125	3,453	300	9	5	447,453	10,276	2,322	2,933	27,417	1,035	273,706	400,876	541,812	1,707,830
1939.....	35	6,502	3,947	339	9	5	269,888	10,302	2,848	2,947	48,209	797	196,887	620,595	386,584	1,539,057
1940.....	38	6,392	3,222	350	9	5	366,403	11,868	2,856	3,017	23,277	1,205	201,467	213,911	643,443	1,467,227
*1941.....	36	5,502	3,080	333	9	5	455,297	17,794	3,911	28,771	30,027	3,454	361,380	427,766	920,470	2,248,870
1942.....	30	6,382	3,878	312	9	5	666,571½	11,197½	3,826	9,721	23,265½	4,649	187,873½	270,622½	633,834	1,811,560½

* Does not include Salmon canned in 1941 from cold storage stocks caught in 1940, particulars of which are given hereunder:—

.....	8	31	1,079	39,104	6,339	46,561
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NOTE.—Licences issued include transfers from one district to another, except in the case of purse-seines.

DEPARTMENT OF FISHERIES

STATEMENT No. 2.—PACK OF CANNED SALMON ON THE NAAS RIVER—1933-1942

Year	Num-ber of can-neries oper-ated	Number of salmon licences issued				Packed canned										
		G.N. Troll	P.S.	D.S.	T.N.	Sockeye	Red Spring	Pink Spring	White Spring	Blue-back	Steel-head	Coho	Pink	Chum	Totals	
						cases	cases	cases	cases	cases	cases	cases	cases	cases	cases	cases	cases
*1933.....	3	297	.....	.....	.....	10,173	1,014	227	214	.....	114	19,016	57,406	2,778	90,942	2,778
†1933.....	.....	.....	.....	.....	.....	9,757	885	227	184	.....	49	3,251	44,306	1,775	60,434	1,775
*1934.....	3	335	.....	.....	.....	36,242	533	126	145	.....	311	26,698	37,698	5,558	107,311	5,558
†1934.....	.....	.....	.....	.....	.....	28,701	383	126	145	.....	311	9,935	32,965	2,648	75,214	2,648
*1935.....	3	310	.....	.....	.....	12,712	94	298	168	.....	143	21,810	25,508	17,481	78,214	17,481
†1935.....	.....	.....	.....	.....	.....	12,245	86	298	168	.....	143	5,125	21,443	12,681	52,188	12,681
*1936.....	3	349	.....	.....	.....	28,562	1,622	229	316	.....	496	11,842	72,022	20,196	135,285	20,196
†1936.....	.....	.....	.....	.....	.....	24,137	520	188	237	.....	496	8,439	60,582	16,504	111,103	16,504
*1937.....	2	321	.....	.....	.....	17,590	773	245	232	.....	46	12,336	7,876	10,530	49,628	10,530
†1937.....	.....	.....	.....	.....	.....	11,630	773	245	232	.....	46	316	5,688	6,009	24,939	5,688
*1938.....	2	309	.....	.....	.....	21,746	458	189	135	.....	188	20,485	61,660	15,135	119,986	15,135
†1938.....	.....	.....	.....	.....	.....	14,795	13	165	125	.....	188	3,986	29,843	6,804	55,919	6,804
*1939.....	2	289	.....	.....	.....	24,425	170	389	149	.....	15	3,209	29,819	2,615	60,791	2,615
†1939.....	.....	.....	.....	.....	.....	18,834	17	297	137	.....	15	1,667	19,479	1,784	42,230	1,784
*1940.....	2	254	.....	.....	.....	13,810	1,258	181	275	.....	120	11,447	29,893	5,461	62,445	5,461
†1940.....	.....	.....	.....	.....	.....	8,056	118	95	99	.....	117	1,975	12,151	2,149	24,750	2,149
*1941.....	2	281	.....	.....	.....	24,876	133	187	207	.....	377	14,430	23,274	5,971	69,455	5,971
†1941.....	.....	.....	.....	.....	.....	14,221	16	125	147	.....	147	6,711	12,570	1,757	35,694	1,757
*1942.....	2	328	.....	.....	.....	24,461	496	366	255	.....	619	21,008	54,038½	12,691	113,934½	12,691
†1942.....	.....	.....	.....	.....	.....	11,415	46	202	159	.....	155	9,804	24,693½	5,794	52,268½	5,794

*Pack of fish caught at Naas River regardless where canned.

† Pack of Naas River regardless where caught.

NOTE.—Licences issued, include transfers from other districts.

STATEMENT No. 3—PACK OF CANNED SALMON ON THE SKEENA RIVER—1933-1942

Year	Num-ber of can-neries oper-ated	Number of salmon licences issued				Packed canned										
		G.N. Troll	P.S.	D.S.	T.N.	Sockeye	Red Spring	Pink Spring	White Spring	Blue-back	Steel-head	Coho	Pink	Chum	Totals	
						cases	cases	cases	cases	cases	cases	cases	cases	cases	cases	cases
1933.....	10	1,218				30,505	2,626	444	227		267	39,896	95,783	15,714	185,463	
1933.....						27,693	6,805	444	828		201	21,366	79,932	10,970	148,239	
1934.....	9	1,164				70,654	6,844	592	860		114	54,470	125,163	24,388	283,085	
1934.....						54,555	6,809	592	860		131	21,298	27,628	6,242	118,118	
1935.....	9	1,053				64,140	3,443	429	188		12	45,512	99,412	31,807	244,943	
1935.....						52,879	3,422	429	188		14	23,498	81,868	8,122	170,420	
1936.....	8	970				97,823	4,883	455	435		33	55,198	178,299	36,892	574,018	
1936.....						81,960	3,781	414	356		33	32,142	92,997	15,343	227,026	
1937.....	7	850				55,811	3,788	382	315		21	34,502	72,455	37,431	204,705	
1937.....						41,023	3,704	382	315		21	14,573	57,623	10,027	127,668	
1938.....	6	1,049				73,508	3,361	1,165	259		42	100,658	145,676	34,785	360,454	
1938.....						46,988	2,916	1,141	259		42	38,542	69,299	14,668	173,855	
1939.....	6	844				96,358	3,277	1,488	348		55	48,973	127,521	15,646	293,686	
1939.....						63,388	3,124	1,396	336		55	27,115	91,559	6,360	198,333	
1940.....	7	926				133,854	5,884	1,113	571		133	62,516	91,612	62,114	359,797	
1940.....						116,505	4,703	1,017	396		130	19,195	46,687	4,684	193,323	
1941.....	7	981				110,544	4,695	703	448		2,261	126,557	73,896	54,357	373,461	
1941.....						81,183	3,929	641	368		1,890	45,891	51,389	12,138	197,429	
1942.....	6	775				57,559	3,850	874	832		3,670	70,384	146,322	31,481	316,952	
1942.....						29,976	5,305	699	617		3,117	36,395½	47,819	10,611	134,539½	

† Pack of fish caught at Skeena river regardless where canned.
 Note.—Licences issued include transfers from other districts.

‡ Pack at Skeena river regardless where caught.

DEPARTMENT OF FISHERIES

STATEMENT No. 4—PACK OF CANNED SALMON FROM FISH CAUGHT AT RIVERS INLET AND SMITHS INLET—1933-1942

Year	Num-ber of can-neries oper-ated	Number of salmon licences issued				Packed canned										Totals
		G.N. Troll	P.S.	D.S.	T.N.	Sockeye	Red Spring	Pink Spring	White Spring	Blue-back	Steel-head	Coho	Pink	Chum	cases	
1933.	11	1,962				119,548	606	108	243		153	9,078	11,658	8,932	150,226	
1933.						114,015	454	108	241		169	8,514	25,054	9,518	158,103	
1934.	11	2,318				89,575	532	82	129		121	11,862	2,928	14,375	119,604	
1934.						82,828	390	82	128		122	8,793	9,769	16,444	118,556	
1935.	8	2,023				166,686	138	332	155		63	9,576	8,966	19,563	205,499	
1935.						129,531	94	306	146		49	917	6,045	7,128	144,216	
1936.	8	2,210				59,138	317	132	162		60	7,432	6,497	13,158	86,896	
1936.						42,803	315	131	148		54	7,683	17,254	10,921	79,309	
1937.	6	1,875				108,170	377	396	235		75	6,374	7,973	18,894	142,494	
1937.						91,399	355	452	235		76	5,331	18,873	21,931	138,631	
1938.	6	2,261				122,093	744	339	359		169	17,527	10,827	15,832	167,732	
1938.						86,490	716	186	351		99	14,284	12,447	17,102	131,625	
1939.	4	1,817				71,068	412	206	329		133	16,125	14,580	7,437	110,290	
1939.						36,937	285	32	306		82	6,302	19,256	4,903	68,103	
1940.	4	1,896				89,142	810	238	320	21	91	12,744	4,085	15,167	122,618	
1940.						48,555	494	101	294		40	7,452	4,515	2,369	65,600	
1941.	2	1,355				115,342	1,006	148	667		179	25,165	5,558	23,203	171,268	
1941.						50,298	624	78	593		104	16,067	6,193	6,236	80,133	
1942.	1	1,505				95,063	745	104	144		60	10,280	1,481	21,364	129,240½	
1942.						24,623	577	32	129		19	6,189	1,446	10,295	43,360	

NOTE.—Figures shown in roman are packs from fish caught at Rivers Inlet or Smiths Inlet. Figures shown in italics are actual packs irrespective of where fish taken and not including fish shipped out for canning in other districts. Licences issued include transfers from other districts.

STATEMENT No. 5—PACK OF CANNED SALMON IN THE FRASER RIVER DISTRICT—1933-1942

Year	Num- ber of can- neries oper- ated	Number of salmon licences issued					Packed canned									Totals
		G.N.	Troll	P.S.	D.S.	T.N.	Sockeye cases	Red Spring cases	Pink Spring cases	White Spring cases	Blue- back cases	Steel- head cases	Coho cases	Pink cases	Chum cases	
1933	10	1,685	110	64			53,481	5,701	426	4,554	13,299		25,715	143,058	77,330	323,564
1934*	11	1,803	98	105			145,579	5,495	263	11,072	22,566		30,751	35,847	219,331	470,904
1934†							133,159	4,713	173	10,760	1,607		10,991	342	103,081	264,826
1935*	10	1,663	124	108			76,415	5,181	326	6,783	7,701		63,933	182,528	72,353	415,220
1935†							57,212	4,205	212	4,984	350		24,600	111,328	8,227	211,118
1936*	11	1,784	118				165,651	7,128	461	8,426	20,647	6	51,243	23,842	188,538	465,942
1936†							164,408	6,680	310	8,142			22,572	2	30,063	232,777
1937*	10	2,082	190	58			103,137	3,877	226	1,940	19,065	15	25,618	252,416	119,254	525,548
1937†							66,583	3,622	84	1,738	1,354		11,242	87,897	20,934	193,469
1938*	2,319	190	112				217,882	4,592	413	1,532	21,923	72	54,314	29,862	181,444	512,034
1938†							169,430	3,754	32	508			28,087	63	49,835	252,322
1939*	10	2,161	210				73,216	5,092	475	1,511	32,833	86	48,120	204,681	143,020	509,034
1939†							43,294	4,466	448	1,094	8,428	69	17,144	108,608	42,480	225,986
1940*	10	2,237	212				121,080	4,036	311	1,042	13,627	178	47,397	13,243	178,860	379,774
1940†							86,215	3,411	279	770		144	12,369	12	40,056	143,256
1941†	11	2,025	195				149,716	7,132	1,285	25,507		248	28,260	102,799	90,274	405,221
1941*							196,871	8,290	1,425	26,396	18,466	315	91,571	179,071	360,623	883,028
1942†	12	2,754	406				418,491	2,396	324	6,992		314	10,559	136	82,586	521,788
1942*							474,035½	2,856	688	7,552	22,999½	314	34,004	9,075	264,736	816,260

* Represents actual pack, regardless where caught.

† Represents pack of Fraser fish, regardless where canned.

NOTE.—Licenses issued include transfers from other districts. 1936† pack of Sockeye on Fraser, 164,408 cases, does not include 16,611 cases Sockeye caught on Fraser and exported and canned in Puget Sound canneries. 1940† pack of Sockeye on Fraser, 86,215 cases, does not include 4,536 cases Sockeye caught on Fraser and exported and canned in Puget Sound canneries. 1941: The above figures do not include packs of salmon canned in 1941 from Cold Storage stocks caught in 1940, particulars of which are given hereunder:

1941 pack of 1940 catch.....	Red Spring	Pink Spring	White Spring	Coho	Chums	Totals
	8	31	1,079	39,104	6,339	46,561

DEPARTMENT OF FISHERIES

STATEMENT No. 6—PACK OF CANNED SALMON OF PUGET SOUND, U.S.A., FROM
1933 to 1942

Year	Number of canneries operated	Spring	Sockeye	Coho	Chum	Pink	Steelhead	Total
		cases	cases	cases	cases	cases	cases	cases
1933.....	19	20,869	125,738	44,568	37,039	543,340	222	771,776
1934.....	20	14,398	352,579	69,254	73,337	3,606		513,174
1935.....	14	9,737	54,677	71,985	15,604	377,445		529,448
1936.....	9	6,328	59,505	29,119½	80,831½	1,345		177,201
1937.....	14	8,968	60,259	32,559	17,417	327,833		447,036
1938.....	13	2,787½	134,651	9,820½	7,852½	193		155,304½
1939.....	14	2,439	43,511	54,773	14,505	275,485		390,713
1940.....	9	1,991	63,890	30,478½	21,618	2,732		120,718½
1941.....	9	4,706	110,605	45,968	21,170	153,686		336,135
1942.....	10	1,460	263,458	6,582	3,896	710		276,106

STATEMENT No. 7—STATEMENT OF HALIBUT LANDINGS—BRITISH COLUMBIA—
1930-42*

(Includes landings in United States bottoms)

	Cwt.
1930.....	254,796
1931.....	182,005
1932.....	168,847
1933.....	170,372
1934.....	182,602
1935.....	171,143
1936.....	168,121
1937.....	187,425
1938.....	193,488
1939.....	227,188
1940.....	239,043
1941.....	229,658
1942.....	243,915

* Figures for earlier years may be found in the annual report for 1940-41.

STATEMENT No. 8—CANNED PILCHARD PACK—BRITISH COLUMBIA—1933-1942

	Cases		Cases
1933.....	2,946	1938.....	69,374
1934.....	35,437	1939.....	7,300
1935.....	27,184	1940.....	59,166
1936.....	35,007	1941.....	58,038
1937.....	40,975	1942.....	46,451

NOTE.—For earlier figures see departmental report for 1940-41.

STATEMENT No. 9—PRODUCTION FISH OIL AND MEAL—BRITISH COLUMBIA,
1933-1942

Year	From Pilchards		From Herring		From Whales			From Other Sources*	
	Meal and fertilizer	Oil	Meal	Oil	Whale- bone and meal	Fertilizer	Oil	Meal and fertilizer	Oil
	tons	gals.	tons	gals.	tons	tons	gals.	tons	gals.
1933....	1,108	275,879	4,078	316,213	249	223	509,310	1,596	187,560
1934....	7,626	1,635,123	2,570	104,710	340	631	813,724	2,458	337,025
1935....	8,681	1,649,392	5,262	306,767	211	354	426,772	2,147	247,437
1936....	8,715	1,217,097	10,985	782,499	332	687	763,740	3,148	335,969
1937....	8,483	1,707,276	14,427	1,283,658	268	527	662,355	2,720	294,546
1938....	8,891	2,195,850	9,624	929,158	273	490	543,378	2,491	228,157
1939....	906	178,305	16,462	1,366,607				3,004	283,504
1940....	4,853	877,556	24,264	1,700,819	181	434	361,620	3,526	285,314
1941....	10,473.2	1,789,708	8,757.5	584,157	271	577	566,505	5,081.6	390,939
1942....	11,550	1,622,840	10,898	643,577	130	205	255,556	4,837	263,481

* Salmon and halibut offal, gray fish, and anchovies.

STATEMENT No. 10—NUMBER OF WHALES LANDED—BRITISH COLUMBIA—1933-1942

Species	1933	1934	1935	1936	1937	1938	1940	1941	1942
Sperm.....	190	265	175	311	265	252	126	233	130
Sulphur.....	1		6	3	1	4	2	1	1
Fin.....	17	71	20	48	44	50	90	67	25
Hump.....		14	1	14	7	4	2	27	7
Sei.....	1			2					
Totals.....	209	350	202	378	317	310	220	328	163

* No whaling plants operated in 1939.

STATEMENT No. 11—STATEMENT OF LICENCES ISSUED FOR SALMON CANNERIES AND SALMON FISHING GEAR (NOT INCLUDING LICENCES TO CAPTAINS AND ASSISTANTS ON SALMON SEINE-BOATS OR ASSISTANTS ON SALMON GILL-NET BOATS) BRITISH COLUMBIA—1933-1942

Kind of Licence	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942
<i>District No. 1—</i>										
Salmon cannery.....	10	11	10	11	10	10	10	10	11	12
Salmon trolling.....	110	98	124	118	190	190	210	212	195	400
Salmon gill-net.....	1,685	1,803	1,663	1,784	2,082	2,319	2,161	2,237	2,025	2,670
<i>District No. 2—</i>										
Salmon cannery.....	29	31	26	27	20	22	18	20	17	14
Salmon purse-seine.....	55	100	102	99	82	100	98	131	95	105
Salmon drag-seine.....	11	9	9	9	9	9	9	9	9	9
Salmon trolling.....	882	937	930	964	916	958	863	737	791	706
Salmon gill-net—										
Lowe Inlet.....	59	67	58	74	76	80	135	106	61	25
Naas River.....	297	335	310	349	321	309	289	254	281	170
Skeena River.....	1,218	1,164	1,053	970	856	1,049	844	926	981	765
Rivers Inlet.....	1,603	1,899	1,699	1,802	1,490	1,796	1,550	1,518	1,070	640
Smiths Inlet.....	359	39	324	408	385	465	267	378	285	107
Bella Coola.....	228	285	268	265	261	242	216	192	161	155
Butedale.....	43	48	41	57	18	80	102	148	78	3
Namu.....	107	141	129	146	137	159	148	134	93	109
Queen Charlotte Islands.....	2	19		24	4	53	9	14	8	42
Total, salmon gill-net, District No. 2.....	3,916	4,377	3,882	4,095	3,548	4,233	3,560	3,670	3,018	2,016
<i>District No. 3—</i>										
Salmon cannery.....	10	7	7	8	7	6	7	8	8	4
Salmon trap-net.....	8	8	8	7	5	5	5	5	5	5
Salmon purse-seine.....	183	187	191	188	209	200	241	219	238	207
Salmon drag-seine.....	20									
Salmon trolling.....	1,888	2,064	2,053	2,429	2,056	2,305	2,874	2,273	2,094	2,737
Salmon gill-net.....	512	646	673	741	466	573	781	485	459	567
<i>Whole Province—</i>										
Salmon cannery.....	49	49	43	46	37	38	35	38	36	30
Salmon trap-net.....	8	8	8	7	5	5	5	5	5	5
Salmon purse-seine.....	236	296	293	287	291	300	339	350	333	312
Salmon drag-seine.....	31	9	9	9	9	9	9	9	9	9
Salmon trolling.....	2,880	3,099	3,107	3,511	3,162	3,453	3,947	3,222	3,080	3,843
Salmon gill-net.....	6,113	6,826	6,218	6,620	6,096	7,125	6,502	6,392	5,502	5,233

NOTE.—Salmon cannery licences shown above were issued by the Provincial Fisheries Department.

STATEMENT No. 12—PACK OF SOCKEYE SALMON FROM RUNS TO FRASER RIVER, 1933-1942

Year	Fraser River Pack	Canadian Traps in Juan de Fuca Straits	Puget Sound Pack	Total Cases*
1933.....	43,745	8,721	125,738	178,204
1934.....	133,159	6,117	352,579	491,855
1935.....	57,212	5,610	54,677	117,499
1936.....	164,408	3,837	59,505	227,750
1937.....	66,583	6,152	60,259	132,994
1938.....	169,430	3,784	139,173	312,387
1939.....	43,249	4,290	43,511	91,050
1940.....	86,215	2,247	63,890	152,352
1941.....	149,715½	9,563	110,605	269,883½
1942.....	418,491	8,488	263,458	690,437

*Figures represent pack of Fraser River sockeye, regardless where canned.

DEPARTMENT OF FISHERIES

STATEMENT No. 13—STATEMENT OF FISHERY LICENCES ISSUED—BRITISH COLUMBIA—SEASON 1942-1943

Variety of Licence	Issued			Transfers			Operating				
	Whites	Indians	Cancelled	Total	Whites	Indians	Total	Whites	Indians	Cancelled	Total
Salmon Trap-net.....	5	9	.....	5	.....	.....	.....	5	9	.....	5
Salmon Drag-seine.....	271	40	1	312	.....	.....	.....	271	40	1	312
Salmon Purse-seine.....	3,694	1,557	2	5,253	742	387	1,129	4,436	1,944	2	6,382
Salmon Gill-net.....	3,303	539	1	3,843	32	3	35	3,335	542	1	3,878
Salmon Trolling.....	243	210	.....	453	12	1	13	255	211	.....	466
Asst. Salmon Gill-net.....	131	114	1	246	.....	.....	.....	131	114	1	246
Capt. Salmon Purse.....	1,029	793	.....	1,822	.....	.....	.....	1,029	793	.....	1,822
Asst. Salmon Purse.....	717	62	.....	779	4	.....	4	721	62	.....	783
Cod.....	59	9	.....	68	.....	.....	.....	59	9	.....	68
Crab.....	1,025	207	1	1,233	1	1	2	1,026	208	1	1,235
Grayfish.....	103	7	.....	111	.....	.....	.....	103	7	.....	111
Miscellaneous.....	.....	13	.....	13	.....	.....	.....	.....	13	.....	13
Abalone.....	43	.....	.....	43	.....	.....	.....	43	.....	.....	43
Small Dragger.....	51	.....	.....	51	.....	.....	.....	51	.....	.....	51
Snelt.....	31	.....	.....	31	.....	.....	.....	31	.....	.....	31
Pilchard Purse.....	25	.....	.....	25	.....	.....	.....	25	.....	.....	25
Capt. Pilchard Seine.....	166	3	.....	173	.....	.....	.....	166	3	.....	173
Asst. Pilchard Seine.....	18	7	.....	25	.....	.....	.....	18	7	.....	25
Herring Gill-net.....	13	1	.....	14	.....	.....	.....	13	1	.....	14
Herring Pound.....	1	.....	.....	1	.....	.....	.....	1	.....	.....	1
Herring Drag-seine.....	66	2	.....	68	.....	.....	.....	66	2	.....	68
Herring Purse-seine.....	47	5	.....	52	.....	.....	.....	47	5	.....	52
Capt. Herring Purse.....	342	56	.....	398	.....	.....	.....	342	56	.....	398
Asst. Herring Purse.....	11	.....	.....	11	.....	.....	.....	11	.....	.....	11
Capt. Halibut boat for bait.....	204	137	.....	341	.....	.....	.....	204	137	.....	341
Capt. Halibut or Black Cod.....	3	.....	.....	3	.....	.....	.....	3	.....	.....	3
Whaling.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Totals.....	11,601	3,771	7	15,379	791	392	1,183	12,392	4,163	7	16,562

Indian permits, 1,363.

STATEMENT No. 14—STATEMENT OF DIFFERENT SPECIES OF SALMON AND METHOD OF CAPTURE REPORTED BY OPERATORS OF SALMON PURSE-SEINES, DRAG-SEINES AND TRAP-NETS AND BY SALMON CANNING, CURING AND COLD STORAGE ESTABLISHMENTS, OF GILL-NET AND TROLL CAUGHT FISH—BRITISH COLUMBIA—SEASON 1942.

Method of Capture	Sockeye	Springs	Blue-backs	Steel-head	Coho	Pinks	Chums	Total
Troll.....	5,883	216,073	274,286	743	1,430,794	47,626	49,459	2,024,864
Gill-net.....	5,082,679	167,817	.....	54,899	1,304,625	1,390,917	1,060,392	9,061,329
Purse-seine.....	2,697,808	14,413	9	826	272,867	2,470,922	3,302,345	8,759,190
Drag-seine.....	23,046	.....	.....	.....	7,926	2,951	1,229	35,152
Trap-net.....	100,432	17,402	.....	1,560	30,523	116	2,844	152,877
Totals.....	7,909,848	415,705	274,295	58,028	3,046,735	3,912,532	4,416,269	20,033,412

STATEMENT No. 15—STATEMENT OF NUMBER OF SALMON CAUGHT BY PURSE-SEINES, SHOWN BY SEINING AREAS, BRITISH COLUMBIA—1942 SEASON

Area No.	Sockeye	Springs	Blue-backs	Steel-heads	Coho	Pinks	Chums	Totals
1.....	22,239	316	.....	3	638	992,119	47,244	1,062,559
2.....	2,623	106	.....	7	18,943	394,653	313,098	729,430
3.....	7,530	644	.....	47	4,321	456,295	87,071	555,908
4.....	350	8	.....	10	1,021	19,844	759	21,992
5.....	36,474	13	.....	18	34,191	167,619	10,069	248,384
6.....	30,853	142	.....	43	35,679	118,279	108,897	293,893
7.....	3,409	105	.....	17	9,337	67,628	130,456	210,952
8.....	235	24	.....	73	2,467	96,472	18,203	117,474
9.....	357	34	.....	23	5,947	20,675	20,479	47,515
10.....	750	22	.....	4	4,061	7,191	30,099	42,127
11.....	.....	.....	.....	.....	874	.....	.....	874
12.....	474,842	7,232	8	336	63,107	96,710	292,249	934,484
13.....	239,365	1,938	1	199	29,183	26,206	748,519	1,045,411
14.....	.....	72	.....	3	223	.....	84,555	84,853
15.....	.....	1	.....	.....	89	.....	28,377	28,467
16.....	352	12	.....	4	2,754	6,469	20,486	30,077
17.....	1,860,379	1,178	.....	10	1,535	299	1,157	1,864,558
18.....	4,886	732	.....	21	3	274	21,814	27,730
19.....	11,889	.....	.....	.....	.....	.....	.....	11,889
20.....	.....	.....	.....	.....	.....	.....	.....	.....
21.....	.....	31	.....	.....	19,127	.....	196,837	215,995
22.....	.....	1	.....	.....	13,190	.....	124,625	137,816
23.....	469	1,802	.....	6	4,819	.....	401,894	408,990
24.....	786	.....	.....	.....	5,548	.....	87,864	94,198
25.....	20	.....	.....	2	6,493	131	340,059	346,705
26.....	.....	.....	.....	.....	2,765	.....	137,274	140,039
27.....	.....	.....	.....	.....	6,552	58	50,260	56,870
Total.....	2,697,808	14,413	9	826	272,867	2,470,922	3,302,345	8,759,190

DEPARTMENT OF FISHERIES

STATEMENT No. 16—STATEMENT SHOWING PACKS OF CANNED SALMON, 1932-1942
WITH QUANTITIES GRADED SECOND QUALITY AND PERCENTAGES

—	Sockeye	Spring	Steel-head	Blue-back	Coho	Pink	Chum	Total
1932 Pack, cases.....	284,355	76,060	1,168	28,505	160,466	223,716	306,761	1,081,031
Grade B, cases.....	3,355	1,234	.....	164	333	119	3,083	8,288
Per cent.....	1.179	1.622	.....	.575	.207	.053	1.005	.766
1933 Pack, cases.....	258,107	20,266	1,459	21,763	137,289	532,558	293,630	1,265,072
Grade B, cases.....	494	.....	.....	10	873	15,149	887	17,413
Per cent.....	.191	.....	.....	.045	.635	2.844	.302	1.376
1934 Pack, cases.....	377,882	29,784	1,282	29,556	195,874	435,364	513,184	1,582,926
Grade B, cases.....	21,620	139	5	.....	962	4,085	1,127	27,938
Per cent.....	5.721	.466	.390	.....	.491	.938	.219	1.764
1935 Pack cases.....	350,444	21,920	596	15,319	216,173	514,966	409,604	1,529,022
Grade B, cases.....	3,435	659	.....	.....	3,840	20,528	5,601	34,063
Per cent.....	.980	3.006	.....	.....	1.776	3.986	1.367	2.227
1936 Pack, cases.....	415,024	29,854	1,068	33,718	212,343	591,532	597,487	1,881,026
Grade B, cases.....	13,725	.....	.....	.....	483	29	5,265	19,502
Per cent.....	3.307	.....	.....	.....	.227	.005	.881	1.036
1937 Pack, cases.....	325,774	16,171	844	19,236	113,972	585,576	447,602	1,509,175
Grade B, cases.....	65	.....	.....	.....	68	27,282	3,212	30,627
Per cent.....	.019	.....	.....	.....	.059	4.659	.717	2.029
1938 Pack, cases.....	447,453	15,531	1,035	27,417	273,906	400,876	541,812	1,707,830
Grade B, cases.....	16,361	.....	.....	56½	1,111	1,413	1,583	20,524½
Per cent.....	3.656	.....	.....	.206	.405	.352	.292	1.201
1939 Pack, cases.....	269,888	16,097	797	48,209	196,887	620,595	386,584	1,539,057
Grade B, cases.....	3,444½	11	20	17	142½	45,667	1,068	50,370
Per cent.....	1.276	.068	2.509	.035	.072	7.358	.276	3.272
1940 Pack, cases.....	366,403	17,741	1,205	23,277	201,467	213,911	643,443	1,467,227
Grade B, cases.....	1,778½	57	.....	13	461	2,530	3,298½	8,138
Per cent.....	.485	.321	.....	.054	.228	1.182	.512	.554
1941 Pack, cases.....	445,297	50,476	3,454	30,027	361,380	427,766	920,470	2,248,870
Grade B, cases.....	1,186½	152½	2	33	539½	64,866	25,161½	91,941
Per cent.....	0.260	0.301	0.057	0.109	0.149	15.163	2.733	4.088
1942 Pack, cases.....	666,046	24,703	4,649	23,265	187,873	270,663	634,784	1,811,983
Grade B, cases.....	41,045	256	.....	87	430	5,841	19,375	67,034
Per cent.....	6.162	1.036	.....	0.373	0.228	2.158	3.052	3.699

STATEMENT No. 17—RECAPITULATION OF FISH LIVER AND VISCERA PRODUCTION—1942

Species	Purchases		Shipped from B.C. to other Canadian Markets		Exported to U.S.		In Cold Storage		Liver Oil		Total Value Marketed or Prepared for Market \$
	Lbs.	Value to Fishermen \$	Lbs.	Value \$	Lbs.	Value \$	Lbs.	Value \$	Lbs.	Value \$	
Gray Cod Livers.....	29,979	2,005	.....	.....	3,660	223	687	33	11,837	5,232	5,488
Halibut Livers.....	171,609	91,618	.....	.....	.....	.....	820	812	44,136	150,955	151,767
Halibut Viscera.....	251,913	44,655	1,587	95	.....	.....	6,972	1,065	9,044	72,544	73,704
Black Cod Livers.....	39,165	32,150	443	354	217	173	375	223	7,144	52,478	53,228
Black Cod Viscera.....	5,302	647	.....	.....	.....	.....	1,511	174	1,167	11,355	11,529
Ling Cod Livers.....	125,423	115,949	3,650	3,885	3,002	2,747	17,282	10,114	12,205	155,537	172,283
Ling Cod Viscera.....	66,622	5,170	.....	.....	.....	.....	3,628	374	7,731	1,474	1,848
Red Cod Livers.....	19,994	10,596	1,505	1,354	447	151	2,513	1,173	2,116	18,351	21,029
Red Cod Viscera.....	40	4	.....	.....	.....	.....	297	16	.....	.....	16
Dogfish Livers.....	4,241,256	688,040	49,240	18,670	.....	.....	23,746	4,580	2,851,624	1,189,941	1,213,191
Soupfin Shark Livers.....	48,768	136,137	.....	.....	7,449	40,712	1,010	1,423	18,375	126,461	168,596
Salmon Livers.....	.....	.....	.....	.....	.....	.....	6,426	321	.....	.....	321
Mudshark Livers.....	216,305	27,042	.....	.....	.....	.....	1,788	59	124,219	39,505	39,564
Ratfish Livers.....	117,219	6,125	16,695	1,637	.....	.....	4,064	157	69,290	6,276	8,070
Mixed Low Potency Oil.....	.....	.....	.....	.....	.....	.....	.....	.....	219,283	15,350	15,350
Mixed Viscera.....	.....	.....	.....	.....	.....	.....	13,688	1,369	1,586	22,150	23,519
Skate Livers.....	24,151	679	.....	.....	.....	.....	1,465	44	7,379	835	879
Totals: Values.....	.....	1,160,817	.....	25,995	.....	44,006	.....	21,937	.....	1,868,444	1,960,382

SPAWNING REPORT, 1942

The following are the outstanding features apparent from this year's examination of the salmon spawning grounds of the province:

- (1) There was an immense return of sockeye to the spawning grounds of the Adams River, Little River, and other Shuswap areas frequented by this variety, notwithstanding the fact that the run had produced an unusually large pack for District No. 1.
- (2) The return of sockeye to the Chilco system exceeded that of the brood year of 1938 by 400 per cent. This cycle, in common with others of the Chilco area, has been increasing most satisfactorily.
- (3) A seeding by approximately 3,000 sockeye salmon in the Stellaco River, in the Francois Lake area, produced this year a return estimated at just under 40,000 fish, a remarkable showing.

(The above are all portions of the Fraser River watershed.)

- (4) The excellent supplies of spawning salmon found in the watersheds above mentioned are unassailable evidence that there was no real blockade at Hell's Gate this year. Water conditions were most favourable, particularly during the sockeye run, and the salmon passed safely through without any assistance.
- (5) In the very considerable spawning area of Yakoun River, Massett Inlet, Queen Charlotte Islands, the return of pink salmon to the spawning grounds this year was the greatest since the large run of 1930, notwithstanding a most satisfactory commercial catch.

Details as to conditions in the several spawning areas are as follows:—

Queen Charlotte Islands.—The escapement of springs to the Yakoun River was larger than usual. Coho were found to be very plentiful in the Yakoun, and, in fact, in all the streams usually frequented by this variety. The inspector speaks of the escapement as the heaviest in his fourteen years' experience. This has been what is usually known as the big year for pinks in the Massett Inlet area. Since 1930 the runs have been more or less unsatisfactory. However, this year the spawning grounds were found to be crowded with pinks. The seeding of this variety in the Yakoun system, and in the two other larger streams is reported as being very heavy, and extremely satisfactory. In the streams along the easterly coast of the islands it was found that Skeedans was the only area well seeded. The escapement of chums in Massett Inlet was very poor. In Naden Harbour, however, there was a good supply. In the streams along the east coast the escapement is reported as being heavier than for some years. This applies even more so to the west coast streams.

Naas Area.—In the Meziaden Lake area a very good run of early sockeye occurred, and the seeding was heavy, under ideal conditions. The same conditions are reported with regard to the late run. The whole seeding is reported as excellent. The fishway at the outlet of Meziaden Lake has been damaged to some extent. What was possible in the way of correcting conditions was done by the inspecting officer, and there is reason to believe that the structure will be efficient for at least another year. In the lower reaches of the Naas River the escapement of the several varieties of salmon is reported as showing marked improvement. The escapement of springs is reported as very heavy, the second year that such satisfactory conditions have obtained. The seeding of coho is reported as being very heavy, although the fish were late in arriving. The pink seeding at Quinnimaas River, Khutzeymateen River, and Ikginik River, and several other smaller streams, is reported as being very heavy. The chum seeding also showed a marked improvement, the total run being reported as one of the heaviest in years.

Skeena Area.—The sockeye seeding in Williams Creek, which is the principal area frequented by this variety, is reported as heavy and better than that of the cycle year, 1938. The other sockeye spawning grounds of the Lakelse Lake system were satisfactorily seeded. A good spawning of coho occurred in Williams Creek and the supply of pinks on the usual spawning grounds is reported as being heavy, comparing favourably with the brood year, 1940. In the Oestahl River watershed the sockeye supply is reported as medium, although it is not a particularly valuable sockeye area. The spring seeding at Johnson Creek was heavy. The coho supply was heavy and better than in the cycle year, 1938. Pinks were found in good quantities, better than the cycle year. The chum supply was medium only. In the important Babine Lake section of this area the quantities of sockeye found on the spawning grounds were hardly equal to those of the year 1938, for instance, although reasonably satisfactory. A larger seeding was expected. At several streams tributary to the lake, conditions were very encouraging. For example, at Pierre Creek the number observed was three times that of the brood year of 1938. There was also an improvement at Twin Creek. The seeding, however, was not up to expectations at Fulton River and Fifteen Mile Creek. The spring salmon supply was found to be quite satisfactory. The coho seeding is reported as fairly heavy. Pink supply, however, was short of that of 1940, the brood year.

Lowe Inlet Area.—It was found impossible to inspect several of the spawning areas in this district, due to very heavy rains during the run upstream. All the lakes and streams were in flood at spawning time. The conclusions reached with regard to the spawning conditions are therefore the result of what observations were possible on the spawning grounds, together with an estimate of the run judged by the commercial fishing results. The sockeye escapement is estimated as being satisfactory. During the early part of the season there was little rain and the streams shrunk to such an extent as to be impassable for salmon. This necessitated fishing closures to preserve a reasonable portion of the run for the spawning grounds. The coho escapement to all streams is reported as heavy. The pink supply showed a decided improvement over the 1940 brood year. This condition was assisted greatly by the extra closed periods. All chum salmon spawning grounds were well supplied; in fact, the escapement was larger than usual.

Butedale Area.—This was reported as the driest season for many years. Many of the small streams dried up completely. Only light supplies of sockeye were observed on the spawning grounds, generally speaking, although some of the larger streams which were not so much affected by the dry weather showed fair supplies. The coho seeding was the heaviest in recent years. Pinks showed an increase over 1940, although some of the smaller streams suffered, due to the dry weather. The escapement to Quaal and Kainet rivers was exceptionally heavy. The escapement of pinks for the area generally is reported as much greater than that of 1940. Chums, however, were scarcer than usual.

Bella Bella Area.—The prolonged dry weather also experienced in this area caused a considerable loss of pinks which were unable to reach their spawning grounds because of the low level of water in the streams. However, the seeding is reported as an average one, generally speaking. The showing of cohoes and chums was much more satisfactory. Owing to the absence of the regular inspector on military duty, and the illness of the relieving officer, the inspection was made by an officer who, not having had previous experience in the district, was not able to make comparisons with other years.

Bella Coola Area.—Notwithstanding an unusually long period of very dry weather, most of the streams in this area contained sufficient water on the arrival of the salmon to permit the fish to pass safely to the spawning grounds. The

only exceptions were several of the smaller creeks flowing into Dean Channel. The season has been very free of freshets and spawning conditions generally are reported as being very favourable. A very satisfactory supply of sockeye salmon reached the spawning grounds of the Bella Coola and Atnarko River systems, comparing favourably with the run of the brood year, but an unusually large number of "runts" were observed. The spring salmon supply is reported as being excellent, for the fifth successive year, the inspecting officer saying that this run has been built up beyond expectations. The supply of cohoes was quite satisfactory. A surprisingly good supply of pinks was found, which was remarkable in view of the failure of the run in the cycle year. A good supply of chums also was present on the spawning grounds.

Rivers Inlet Area.—The sockeye escapement here is reported as being very good. Quap River is reported as being abnormally well seeded. The supplies found in Genesi River were good, equal to the year 1938 and better than the year 1937. The Shumahault River received an average seeding. At Indian River the escapement was good, being better than in 1938 and much better than in 1937. The same conditions apply to the Waukwash River. Good seedings were observed at Cheo, Nookins, Markwell and Dallec rivers, and Hatchery Creek. The spawning in the Whonnock River, which drains Owekano Lake system to the sea, was very good. Spring salmon were observed in good quantities in the Indian and Waukwash rivers. Summarizing the conditions in the Owekano Lake district the inspector states that he considers the escapement for 1942 to be at least on a par with that for 1938 and much better than in 1937. In the areas directly tributary to salt water, such as Moses Inlet, Kildala Bay, Hole-in-the-Wall, and Draney's Inlet, the seeding of cohoes was only a medium one. There was, however, a good escapement of chums.

Smiths Inlet Area.—The sockeye spawning is reported as being good in this area, very good in relation to the commercial catch. The only two important sockeye streams are the Geluck and Delabah rivers. These were well supplied with fish. The seeding of cohoes was only average, but fairly heavy in the case of chums.

FRASER RIVER WATERSHED

Prince George Area.—The sockeye seeding in the Stuart Lake system is reported as being two-thirds greater than that of the brood year. There were good runs, comparatively speaking, to Forfar Creek and Kynoch Creek, tributary to Middle River. Better supplies were found in Rosette and Gluske creeks. The later run to the Fraser-Francois Lake watershed showed a remarkable increase over the brood year. In 1938 approximately 3,000 sockeye were observed in the Stellaco River and from this seeding between 35,000 and 40,000 sockeye arrived in the river this fall. Their condition was reported as splendid, thousands showing no outside scars or abrasions, and the individual size of the fish was of good average, with a number of fine large specimens. Spawning conditions were excellent. The supply of spring salmon on the several spawning grounds of the Prince George area was hardly up to expectations.

Quesnel Area.—The large increase in the number of spawning sockeye found in the Chilco river and lake system is the outstanding feature in the report for this particular district. The increase in the number of spawners over the brood year of 1938 is estimated at over 400 per cent. The conditions in this particular system during recent years have been extremely encouraging. The Bowron River system contained a small quantity of spawning sockeye, equal to the seeding of 1938. No sockeye were found in the Horsefly River or Quesnel Lake systems. The spring salmon spawners were found in quantities, generally speaking, comparable with those of recent years.

Kamloops Area.—The return this year of sockeye was the result of the very heavy seeding of 1938, and proved up to expectations. The principal sockeye spawning grounds are the Adams river and lake system, Little River, and several of the streams tributary to Shuswap Lake. Every foot of Little River and Adams River was crowded with spawning sockeye and others passed in a continuous stream through the fishway constructed on the left side of Adams River, in the dam erected about one-half mile below the foot of the lake. This one-half mile above the dam was also covered with spawning sockeye, and there is reason to believe that many passed up into the lake area, although it would appear from the information at hand that there are few valuable sockeye streams tributary to Adams Lake. There is evidence, however, that a certain quantity of sockeye spawned along the lake shore. Scotch Creek, Seymour River, and Shuswap River also received a good supply, although the spawning areas are not comparable in size with those of the above mentioned district. The water levels at Hell's Gate during the time the Adams-Shuswap run was moving through were such as to permit the easy passage of the salmon, without any assistance. There would appear to be reason to believe, therefore, that all salmon heading for the system safely reached the spawning grounds. They arrived in excellent condition. The spring salmon supply was quite satisfactory, in comparison with that of other years. The individual fish were unusually large, and arrived in excellent condition. The coho supply was also up to average, although the fish were individually smaller than usual.

Pemberton Area.—There was a remarkable return of sockeye to the spawning grounds of the Birkenhead River system, the estimated number of parent fish being 83,000, compared with 30,000 in the brood year of 1938—an increase of approximately 180 per cent. The streams tributary to the Lillooet Lake system also contained an unusually large number of spawning sockeye. There was also a seeding of this same variety in the Anderson-Seton Lake system, something like 1,000 salmon, compared with approximately 450 in the brood year. It has been observed that when the water conditions make the rapids in the Fraser River at the outlet of Bridge River unusually difficult, greater numbers of sockeye appear in the Anderson-Seton system. The supply of spring salmon was similar to that of 1939, in the Birkenhead system. It is estimated at approximately 45,000 fish. The coho seeding is considered satisfactory throughout the whole of the Pemberton-Squamish area. This has been the "off" year for the pink variety. The supply of chums in the Squamish system was found quite satisfactory.

Chilliwack Area.—The run of sockeye reaching the Chilliwack system, always a light one, is reported this year as average. The Cultus Lake run, however, up to November 23, the date of inspection, by actual count had reached a total of 18,620 and was expected to exceed 20,000 fish. There were a few showing in Kawkawa Lake. No distressed sockeye were found in the Coquihalla River or at the outlets of other streams, which occurs when there is a serious blockade at Hell's Gate. The spring seeding is reported as only fair. The coho supply to the Chilliwack River was good but the Vedder River was not so well stocked, although conditions were better in several of the smaller tributaries. The chum seeding in the Chilliwack and Vedder systems was quite good. Sweltzer Creek was unusually heavily stocked. The steelhead seeding is reported as satisfactory.

Harrison Area.—In the Harrison Lake system sockeye spawning at Hatchery Creek, Silver Creek, and Douglas Creek, tributary to Harrison Lake, was very similar to that of the brood year. There were the usual number of fish in the Harrison River at what is known as The Rapids. At Morris Creek there was a good spawning, an increase over that of 1938. In the Harrison Rapids the spring spawning was heavier than usual, and was reported as the best in years. The

coho supply can be considered only as medium. Chums, on the other hand, were present in larger quantities than for some years; the supply is reported as being heavy in the Stave and Harrison rivers.

Pitt Lake Area.—In the Pitt River watershed the sockeye spawning was somewhat greater than that of the brood year. There was an average supply of coho, with a heavy seeding of chums.

Lower Fraser Area.—In the Serpentine and Nicomekl rivers the supply of coho on the spawning grounds compared very favourably with that of the brood year of 1939. Spawning was late, due to lack of rain. Coho supplies in the Alouette, Coquitlam, Bear and Salmon rivers were only medium, whereas the seeding of chums was excellent.

North Vancouver Area.—Coho seeding was good and the quantities of spawning chum salmon were satisfactory.

OTHER AREAS

Alert Bay Area.—Very satisfactory supplies of sockeye were found on the main Nimpkish River spawning grounds, and they were estimated at twenty-five per cent greater than in the brood year. Satisfactory numbers were also observed at Fulmore River, Port Neville, Keough River, and other sockeye streams. The spring seeding is reported as fairly satisfactory, with a heavy seeding at Nimpkish River. The coho supply was medium, except at Viner Sound, Salmon River, and Seymour River, where it is reported as heavy. The pink supply was disappointing, generally speaking, although a satisfactory seeding occurred at Embley River, Wakeman River, Keough River, and Kingcome River. The chum seeding was good at Salmon River and in the streams draining into Seymour Inlet; heavy supplies were observed at Viner River, Adams River and Nimpkish River. Chum supplies generally were satisfactory.

Quathiaski Area.—The sockeye seeding at Hayden Bay, Loughborough Inlet, and Phillips Arm was quite satisfactory, that at Hayden Bay particularly being reported as excellent and an improvement over the brood year by at least thirty per cent. The spring seeding was a fair average only, though conditions were somewhat better at Campbell River. The coho supplies were poor, with the exception of the streams draining into Loughborough Inlet, Phillips Arm, and Bute Inlet, where the escapement was somewhat better. The pink escapement was very poor at Bear River, although the streams draining into Loughborough Inlet received more satisfactory supplies. The chum seeding was only fair.

Comox Area.—This is not a sockeye area. The spring salmon supplies are reported as light, compared with the seasons 1936 to 1939, though an improvement over 1940 and 1941. Coho seeding was very satisfactory, generally speaking. The pink supply was found to be entirely inadequate. The chum escapement is reported as good, particularly at Little Qualicum River where a heavy seeding occurred. The supply at Big Qualicum, however, did not come up to expectations. Conditions at Courtenay River were satisfactory.

Pender Harbour Area.—The sockeye supplies in the Saginaw system were somewhat better than in the brood year, which, however, was reported as the lightest on record. Spring and coho supplies were normal. This also applies to the pink seeding, in so far as the streams draining into Toba Inlet and Narrows Arm are concerned; in all other sections, however, the seeding was unsatisfactory. Chums were found in satisfactory numbers in most of the streams in the area.

Ladysmith Area.—The supplies of springs and cohoes were quite up to a good average. This is not an important pink area but the usual number were found on the spawning grounds. There was an improvement in the chum spawning over the seasons of 1938 and 1939 but seeding was not equal to the unusually good showing of 1941.

Cowichan Area.—It is estimated that between 30,000 and 40,000 spring salmon reached the spawning grounds of the Cowichan River, above Skutz Falls. In addition, there was a good seeding in the lower part of the river. The number of cohoes is estimated at between 40,000 and 60,000 above Skutz Falls fishway, with a considerable seeding in the area below the falls. The seeding of cohoes was also very satisfactory in the Koksilah River, as well as in Kelvin, Glenora and Norie creeks. A satisfactory quantity of chums was observed.

Victoria Area.—This is a fall salmon area, with no large streams which can be utilized for spawning purposes. The coho and chum is estimated as being of fair average proportions.

Alberni Area.—In the principal sockeye areas of the Somass-Stamp River system there was a splendid supply of sockeye. The count through the fishway at Stamp Falls was the largest of any season. At Anderson River the escapement was fair but the spawning beds were reasonably well seeded. The supply on the Hobarton River beds was larger than usual. The seeding of springs in the main streams such as the Somass, Nahmint, Sarita, Toquart and Nitinat rivers was found to be good. The escapement of cohoes to the main spawning areas of the system is reported as very satisfactory. The chum seeding has also been very good.

Clayoquot Area.—The sockeye supplies on the spawning grounds in this area are reported as being considerably heavier than during the brood year, 1938, and at least equal to the heavy seeding of 1941, which was the best in the past fifteen years. The supply of pinks and cohoes was an average one. Chum spawning is reported as heavy in practically all streams. Spawning conditions were excellent.

Nootka Area.—The spring and coho supplies on the spawning grounds were found to be normal. The area is more important as a chum district. Supplies of chums are reported as being very good and much better than in the years 1938, 1939, and 1940, although not as heavy as in 1941, an unusually good year.

Kyuquot Area.—Seeding of springs is reported as very good and comparing very favourably with that of previous years. Coho supplies were average and about equal to the brood year of 1939. The chum supplies were excellent and the size of the individual fish was large.

Quatsino Area.—The usual small seeding of sockeye was observed in the few streams frequented by this variety, but the sockeye fishery is not an important one here. In Marble Creek, frequented by approximately seventy-five per cent of the springs which go to the Quatsino area, there was an average supply of this variety. The escapement to the other creeks frequented by springs showed an improvement over recent seasons. The coho seeding throughout the whole district was heavy, the largest quantities being observed in Marble Creek, Rupert Creek, and Spruce River. Pink seeding was better than usual in Rupert River and East Creek. The other small streams received average supplies. The chum escapement was good in proportion to the run, and is considered satisfactory.

APPENDIX No. 3

ANNUAL REPORT ON FISH CULTURE

By J. A. RODD, *Director of Fish Culture*

Fish cultural operations in 1942 were carried on by the Department of Fisheries in Nova Scotia, New Brunswick and Prince Edward Island where the fisheries are entirely, or to a large extent, under Federal administration. Thirteen main hatcheries, six rearing stations, six salmon retaining ponds and several egg collecting camps were operated with a total output from these establishments of 32,522,957, over 77 per cent of which was distributed in the fingerling and older stages. The output by species, hatcheries and provinces was:—

STATEMENT BY SPECIES OF THE FISH DISTRIBUTED DURING THE YEAR ENDED
DECEMBER 31, 1942

Species	Fry	Advanced fry	Fingerlings	Yearlings and older	Total distribution
Salmo salar—Atlantic salmon.....	325,000	3,035,000	11,359,507	69,834	14,789,341
Salmo irideus—Rainbow trout.....			78,688	5,933	84,621
Salmo salar sebago—Sebago salmon.....			62,023	36,665	98,688
Salvelinus fontinalis—Speckled trout....	631,000	3,242,702	13,569,086	107,519	17,550,307
	950,000	6,277,702	25,069,304	219,951	32,522,957

HATCHERIES AND REARING STATIONS OPERATED, THEIR LOCATION, DATE ESTABLISHED, THE SPECIES AND THE NUMBER OF EACH SPECIES DISTRIBUTED FROM EACH ESTABLISHMENT DURING 1942

Estab- lished	Hatchery	Location	Species	Fry	Advanced fry	Fingerlings					Year- lings and older	Total distrib- ution by species	Total distrib- ution by hatcheries
						No. 1	No. 2	No. 3	No. 4	No. 5			
1929	Antigonish.....	St. Andrews, N.S.....	Atlantic salmon.....		824,000	615,000	109,000	53,000	1,600		6,511	725,600	4,713,996
1876	Redd rd.....	Baiford, N.S.....	Speckled trout.....		2,629,000	420,000	81,734		55,885			3,986,396	4,713,996
1937	Cobequid.....	Jackson, N.S.....	Atlantic salmon.....			131,400	314,500	285,338			6	81,704	81,704
1938	Coldbrook (f).....	Coldbrook, N.S.....	Speckled trout.....		581,500	143,000	643				9,817	731,434	1,465,795
1936	Grand Lake (f).....	Wellington Station, N.S.....	Speckled trout.....				223,000	17,200	202,500		69,898	232,643	232,643
			Sebago salmon.....					14,273			20,366	34,636	
1937	Kejimikujik (f).....	New Grafton, N.S.....	Speckled trout.....			100,000			46,000		39,735	34,735	384,402
			Atlantic salmon.....						41,000			146,000	
1912	Lindliff.....	St. Peters, N.S.....	Speckled trout.....			260,000	578,000	1,817				839,817	187,000
1902	Margaree.....	N.E. Margaree, N.S.....	Speckled trout.....		200,000	1,103,281	582,151		9,661		13,436	1,908,329	2,748,346
1935	Mersey River (f).....	Liverpool, N.S.....	Speckled trout.....		450,000	1,200,000	140,000	249,800	395		5,572	2,040,195	3,330,467
			Atlantic salmon.....			1,499,500	168,000	85,000	92,500	39,700		1,830,272	
1913	Middleton.....	Middleton, Annapolis Co., N.S.....	Speckled trout.....			278,000	4,195					278,000	282,195
1929	Yarmouth.....	South Ohio, N.S.....	Atlantic salmon.....	65,000	21,000	317,000	285,600	150,000	15,000			150,000	1,010,200
			Atlantic salmon.....			106,800	110,000	63,547	26,360			860,200	
1939	Charlo.....	River Charlo, N.B.....	Rainbow trout.....		110,000	663,000	201,512	15,000	56,500	1,000	4,026	1,298,154	1,387,757
			Speckled trout.....			582,710	665,000	50,444			5,087	25,097	1,323,251
1928	Florenceville.....	Florenceville, N.B.....	Atlantic salmon.....	20,000		1,200,000	160,000	10,000			11,870	1,370,000	
			Sebago salmon.....						15,444		8,006	1,874,983	3,256,853
1880	Grand Falls.....	Grand Falls, N.B.....	Speckled trout.....		434,000	1,339,000	70,000	8,533			2,105,994	2,105,994	3,677,836
1874	Miramichi.....	South Esk, N.B.....	Speckled trout.....	480,000	650,000	1,140,000	218,900	98,034			3,451,728	3,451,728	
			Atlantic salmon.....	140,000	1,785,000	1,199,100	18,200	309,428			287,501	3,719,229	
1914	Saint John.....	Saint John, N.B.....	Speckled trout.....	185,000	125,500	137,500	180,000	14,501			370,400	370,400	
			Atlantic salmon.....					5,400			5,921	84,609	
			Rainbow trout.....			58,400	20,288		7,750		4,429	52,179	
1938	Cardigan (f).....	Cardigan, P.E.I.....	Speckled trout.....	66,000	587,860	793,140	303,000	1,000	33,603	3,683	15,319	1,893,605	2,310,793
			Atlantic salmon.....			16,000		393,000	11,400			42,400	
1906	Kelly's Pond.....	Southport, P.E.I.....	Speckled trout.....		150,000	300,310			162,700			555,700	598,100
			Atlantic salmon.....		210,000	447,230	44,850					510,310	
			Speckled trout.....									702,090	1,212,400
				956,000	6,277,702	16,932,911	5,218,796	2,094,916	778,298	44,383	219,951	32,523,957	32,522,957

(f) Rearing station.

The fry and fingerlings included in this distribution were from collections in the autumn of 1941 and the spring of 1942.

NUTRITIONAL EXPERIMENTS

Nutritional experiments were continued; rations that were least efficient last year were discarded and several new ones were tested. The importance of this nutritional work was further stressed by smaller, and in some instances, insufficient quantities, along with increased cost, of the meat products largely used in the feeding of hatchery fish being available. An important advance was made, however, during 1940 on behalf of this Department towards the solution of this feeding problem inasmuch as Doctor W. D. McFarlane, Professor and Chairman of the Department of Chemistry, Macdonald College, McGill University, undertook an investigation of the composition of some of the natural foods of Atlantic salmon and speckled trout fry in the Maritime Provinces. From the results of these analyses he formulated rations that approximated as closely as possible the composition of the natural food, and these were tested at the different hatcheries during 1941. In all, twenty-three different ingredients were used in various compositions and ninety-six tests were made that year.

Some of the rations tested gave promising results inasmuch as the percentage mortality and the cost of the foods that produced a pound of fish were lower than when standard meat products alone were fed. After reviewing with Doctor McFarlane the conclusions from the surveys of 1940 and the results of the feeding tests of 1941, it was agreed that the feeding experiments should be continued during the summer of 1942 at one of the larger hatcheries, by someone with experience in biochemistry and nutritional studies. Fortunately, Miss Enid P. Knight, B.Sc., M.Sc., of the Chemistry department, who was carrying on research on the fundamental aspects of the nutritional requirements of fish, was able to undertake this study, and after consultation with Doctor McFarlane and the writer, and after interviewing Doctors Needler (Director), Leim and Smith of the Atlantic Biological Station, and the Supervisors of Fish Culture for the Maritime Provinces, she spent nearly three months at the Antigonish Hatchery, N.S. Results are being analysed and the investigation is being continued at Macdonald College. Her findings and final conclusions will be made known in due course, but in the meantime, arrangements are being made to carry out at several hatcheries in the Maritime Provinces next year her recommendations based on the experience of the past season.

In addition to Miss Knight's investigations at Antigonish, rations consisting of fifteen ingredients in various combinations were tested at other hatcheries in the Maritime Provinces. In all, sixty-nine tests, exclusive of those at Antigonish, were made at these hatcheries during the season. As was the case in 1941, several of the rations used gave promising results from the standpoint of mortality, growth and the cost of the ration used in producing a pound of fish. The modified potato ricer that was used at the Cortland hatchery, (Tunison and McCay), was thoroughly tested at several hatcheries as a medium of obtaining the best results from the food used in comparison with spreading it on the surface of the water in feeding troughs and tanks and broadcasting it with a spoon on the surfaces of ponds. With the modified ricer the ration reached the fish in worm-like form with all ingredients,—dry food mixtures and meat products,—combined and without separation when the ration went into the water. As opposed to this considerable care is needed in preparing a ration of the proper consistency that can be forced through the perforations in the ricer without undue difficulty and more care is necessary in keeping the ricer clean and sterile than is experienced with the ordinary feeding spoons and pails. Practically all tests were made with speckled trout and those in which dry feed mixtures were used were only started when the fish had reached a length of $1\frac{1}{2}$ inches.

LAKES MANAGEMENT

The Charlotte County Lakes management, a co-operative effort between the Fish Cultural Branch and the Atlantic Biological Station of the Fisheries Research Board, was continued. It comprises eight lakes within a radius of approximately fifteen miles and reasonably convenient to the Station. The biological studies were made by the staff of the Station, the area of the lakes was determined and the stocking plan was devised by Doctor M. W. Smith, a member of the staff. The fish are provided and all expenses due to guardianship and creel census are borne by the Fish Culture Branch.

The plan calls for:—

1. The planting in rotation of speckled trout of three different sizes, viz., No. 2 fingerlings, No. 5 fingerlings and yearlings;
2. The closure of the lakes as they are stocked until the trout planted in them are three years old, and then opening them to angling so that four of the lakes will be open and four closed to angling every year;
3. The maintenance of an adequate patrol to prevent illegal angling, and
4. Creel census to determine the value, in terms of anglers' catch, of stocking lakes of this kind with hatchery fish of three sizes.

Closure was removed and angling permitted with the opening of the speckled trout season on April 1 in Bonaparte and Limeburner Lakes, and a creel census was taken in them and in Johnson and Kerr Lakes. The yield was low being only 0.2 to 1.1 pounds per acre. The number of marked fish reported also was small, being less than 16 per cent of the number taken in Limeburner Lake and nil in Kerr and Johnson Lakes. The fingerlings that were planted in Bonaparte Lake were not marked but a rough estimate of age from length frequencies placed approximately 25 per cent of the captured fish in that group to which the planted fish could have contributed. Some of the fish caught in Bonaparte outlet may also have been from introduced stock. The creel census results for these four lakes in 1942 were:—

	Limeburner Lake	Kerr Lake and stream	Bonaparte Lake and outlet	Johnson Lake
Number of fishermen.....	148	107	238	9
Fish caught.....	57	63	320	6
Marked.....	9	0	0	0
Unmarked.....	48	63	320	6
Hours fished.....	646	235.5	628	19
Fish per hour.....	.09	.27	.51	.31
Hours per fish.....	11.3	3.7	2.0	3.2
Average weight (ounces).....	14.84	7.85	5.53	.....
Pounds of fish caught per acre.....	.4	.2	1.1	.....
Average length (inches).....	12.5	10.5	10	10.5

Johnson Lake this year was stocked with 4,602 No. 4 fingerlings from Saint John hatchery and Kerr Lake with 23,977 No. 3 and 4 fingerlings from Florenceville of which all of the former and 5,025 of the latter were marked by the removal of the adipose and one of the side fins.

• RAINBOW TROUT

As indicated in Supervisor Catt's accompanying report, some excellent rainbow trout angling is being enjoyed in some of the waters in which they have been introduced in the Maritime Provinces.

Although excellent angling in many instances has followed the distribution of this species in these provinces, such introductions have seldom resulted in the establishing of a self-sustaining, non-migratory population. In this respect,

the results in the Maritimes are similar to those of other countries, when rainbow were distributed at considerable distances beyond their natural range.

The first recorded distributions of rainbow trout in the Maritime Provinces were made in 1899 and 1900 in seven lakes and two streams in Nova Scotia and New Brunswick. The fish are reported generally to have provided satisfactory angling when they were in their third year, but in the course of a few more years they disappeared from all these waters with the exception of Crooked creek which flows into the estuary of Shepody River, New Brunswick, near the head of the Bay of Fundy, where a non-migratory population was established without further stocking. They have prevailed not only in Crooked creek but have spread to West River which flows into the Shepody River about ten miles above the mouth of Crooked creek.

As the angling for the native speckled trout closes in September, the presence of rainbow trout in selected and limited areas of the Maritime Provinces would provide not only a variety of angling, but some angling of an excellent nature during the autumn when the native trout are out of condition or are protected by close seasons. Consequently, eighteen years after the first introduction, or in 1917, rainbow trout distributions were again undertaken. In 1917 and 1918 distributions were made in the Saint John district, New Brunswick, and from 1919 to 1924 in the Bear River system, Nova Scotia. Some excellent results were apparent in the Saint John area where spawning fish and specimens of over six pounds were reported. This condition did not continue, and in the course of a few years the species disappeared from these waters although some were landlocked. Rainbow also did well in the Bear River system in their early stages, and considerable numbers were seen, from time to time, but they also disappeared in a few years following the last distributions, and none have since been reported. In this instance, very few were caught and it was surmised that the trout went to sea, as there was nothing to prevent their doing so, and did not return to the waters in which they were distributed.

Distributions in Pisquid (O'Keefe's) Lake, P.E.I., beginning in 1925, have produced excellent sport. The lake is largely landlocked, as during normal summer and low levels the outflow consists of seepage, and during high water is through a small culvert in which a screen has been maintained. Results in Glenfinnan Lake in the same province, in which rainbow were first introduced in 1929, also have been satisfactory. Many large trout have been caught and small and medium size fish have been quite numerous. Glenfinnan Lake also is landlocked except during unusually high water.

The results in Prince Edward Island led to further introductions of rainbow in lakes in Nova Scotia where, in view of previous experience and the migratory habits of the species, Fish and Game Protective Associations and local organizations erected and undertook to maintain screens in the outlets to prevent the trout from leaving the lakes. Excellent angling was enjoyed for a few years in several of these lakes, but the screens were seldom maintained. The fish that were not caught probably migrated, and if there was any natural reproduction, it was insufficient to maintain the stock. In this last group of Nova Scotia lakes, excellent sport has been enjoyed, particularly during the past season, in Sunken (Sumpter) Lake, Kings County, and rainbow up to seven pounds weight have been taken in Pugg Lake, Shelburne County, where there is evidence of good survival. Pugg Lake is landlocked and screens have been maintained by local organizations in the outlet of Sunken Lake.

While rainbow have spawned and excellent angling has been enjoyed in several waters from which they have since disappeared, in only one instance, viz., Crooked creek, N.B., can it be said that a resident non-migratory population maintained itself by natural reproduction where there were no natural or artificial barriers to prevent its migration.

The waters of Crooked creek are alkaline, but rainbow have grown equally as fast, if not faster, in acid lakes that they were unable to leave.

The source and nature of the waters in which rainbow trout are apparently thriving, at the present time, are as follows:—

Water	Source	pH	Outlet
Crooked creek, N.B.....	Springs, fast water, long riffles, deep rock pools.	8.0	Open to sea.
Pisquid Lake (O'Keefe's), P.E.I.....	Springs.....	5.8	Underground seepage except during high water. Outlet screened.
Glenfinnan Lake, P.E.I.....	Springs.....	6.0 to 6.4	Underground seepage except during high water.
Sunken (Sumpter) Lake, N.S.....	Springs.....	7.1 to 7.5	Screened. Seepage.
Pugg Lake, N.S.....	Springs.....	5.5 to 5.8	Underground.

Non-migratory rainbow may be present also in Little River, on which the Saint John, N.B., hatchery is located, as fish ranging from a few ounces to two pounds have been seen. Adult rainbow (Crooked creek stock) released from the Saint John hatchery have spawned there, but it is also possible that the presence of various sizes may be due partly to escapement from the hatchery troughs and ponds. Little River is open to Saint John Harbour and its pH ranges from 7.2 to 7.5.

BLACK BASS

Small-mouthed black bass were transferred from Wheaton (Bocabee) Lake, N.B., to Bunker Lake, near Yarmouth, N.S., and to Big Meadow Pond, Deer Island, N.B.

Bunker Lake and connected waters carry such a heavy population of yellow and white perch that it is not considered feasible to re-establish speckled trout in them, and Big Meadow Pond is unsuitable for trout. As the pond and lake drain directly into salt water the bass, should they be established, will be unable to spread of their own accord to nearby salmon and trout streams, but they will contribute to the angling of the respective districts and make presently non-productive areas productive of sport fish.

TAGGING OF ATLANTIC SALMON

The tagging of Atlantic salmon by the Fish Cultural Service was discontinued in 1941, when 39 were tagged and liberated in September above the net at Margaree Harbour, N.S. Fourteen salmon were tagged and liberated in the upper northwest Miramichi River, N.B., by Doctors L. C. Kingston and Carl Avery, Barrie, Vermont, in September of that year. Recaptures of tagged salmon reported since 1941 were:—

RECAPTURES, 1941—ATLANTIC SALMON

MARGAREE RIVER, N.S.

Number	Weight (pounds)	Length (inches)	Condition	Sex	Date	1. Where liberated 2. Where caught
K1754.....	(d)	.....	Clean.....	M.	Sept. 28, 1939...	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	20	39	Clean.....	M.	July 30, 1941...	Mabou Harbour, Inverness County, N.S.
K1810.....	(d)	.....	Clean.....	M.	Oct. 2, 1939...	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	17	35	Clean.....	M.	Aug. 12, 1941...	About one mile west of Margaree Harbour, N.S.
K2968.....	11	32	Kelt.....	M.	Dec. 4, 1940...	Margaree Pond, N.S.
			Kelt.....	M.	June 17, 1941...	La Pointe, Inverness County, N.S.
K3015.....	12	36	Kelt.....	M.	Dec. 4, 1940...	Margaree Pond, N.S.
			Kelt.....	M.	June 5, 1941...	Margaree Harbour, N.S.
K3073.....	11	32	Kelt.....	F.	Nov. 19, 1940...	Margaree Pond, N.S.
	(u) 16	35	Clean.....	F.	1941...	(a) Margaree Pond, N.S.
K3089.....	9	31	Kelt.....	F.	Nov. 19, 1940...	Margaree Pond, N.S.
			Kelt.....	F.	June 4, 1941...	Tidal waters of Margaree Harbour, N.S.
K3103.....	14	39	Kelt.....	F.	Nov. 22, 1940...	Margaree Pond, N.S.
			Kelt.....	F.	June 14, 1941...	St. Joseph du Moine, Inverness County, N.S.
K3115.....	13	36	Kelt.....	F.	Nov. 22, 1940...	Margaree Pond, N.S.
			Kelt.....	F.	June 19, 1941...	Terre Noire, about two miles northeast of Margaree Harbour, N.S.
K3116.....	12	34	Kelt.....	F.	Nov. 22, 1940...	Margaree Pond, N.S.
		34	Kelt.....	F.	June 15, 1941...	Boat Harbour (near Friar Head), Inverness County, N.S.
K3133.....	12	34	Kelt.....	F.	Nov. 22, 1940...	Margaree Pond, N.S.
				F.	About July 23, 1941.	Cap Rouge, Inverness County, N.S.
K3152.....	14	35	Kelt.....	F.	Nov. 22, 1940...	Margaree Pond, N.S.
			Kelt.....	F.	June 20, 1941...	One-half mile northeast of Margaree Harbour, N.S.
K3171.....	16	38	Kelt.....	F.	Nov. 22, 1940...	Margaree Pond, N.S.
	(u)	.....	Clean.....	F.	1941...	(a) Margaree Pond, N.S.
K3183.....	21	42	Kelt.....	F.	Nov. 29, 1940...	Margaree Pond, N.S.
				F.	About July 23, 1941.	Cap Rouge, Inverness County, N.S.
K3201.....	10	31	Kelt.....	F.	Nov. 29, 1940...	Margaree Pond, N.S.
			Kelt.....	F.	June 18, 1941...	La Pointe, Inverness County, N.S.
K3211.....	18	38	Kelt.....	F.	Nov. 29, 1940...	Margaree Pond, N.S.
			Kelt.....	F.	June 18, 1941...	St. Joseph du Moine, Inverness County, N.S.
K3224.....	8	31	Kelt.....	M.	Dec. 5, 1940...	Margaree Pond, N.S.
			Kelt.....	M.	June 1, 1941...	Tidal waters of Margaree Harbour, N.S.
(f) K3272.....	(d)	37	Clean.....	F.	Sept. 24, 1941...	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	18½	Clean.....	F.	Oct. 8, 1941...	Plaster Pool, Margaree River, N.S.

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RECAPTURES, 1941—ATLANTIC SALMON

MARGAREE RIVER, N.S.

Number	Weight (pounds)	Length (inches)	Condition	Sex	Date	1. Where liberated 2. Where caught
(f) K3285.....	(d)	30	Clean....	F.	Sept. 25, 1941...	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	(z) (u) 7	30	Clean....	F.	1941...	(e) Margaree Pond, N.S.
(f) K3293.....	(d)	32	Clean....	F.	Sept. 27, 1941...	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	12½	.....	Clean....	F.	Oct. 13, 1941...	Brook Pool, Margaree River, N.S.
(f) K3294	(d)	30	Clean....	M.	Sept. 27, 1941...	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	8½	.....	Clean....	M.	Oct. 6, 1941...	McDaniel Pool, Margaree River, N.S.

RIVER PHILIP, N.S.

K1049.....	6½	29	Kelt.....	F.	Nov. 13, 1939...	River Philip Pond, N.S.
	.....	.....	Clean....	F.	Oct. 28, 1941...	(c) River Philip Pond, N.S.
K1128.....	12	34	Kelt.....	F.	Nov. 13, 1939...	River Philip Pond, N.S.
	(z) (u) 13	36	Clean....	F.	Oct. 22, 1941...	(c) River Philip Pond, N.S.
	(o) 16	.....	.....	.....	.....	.....
K1145.....	13½	35½	Kelt.....	F.	Nov. 14, 1939...	River Philip Pond, N.S.
	(z) (u) 19	39	Clean....	F.	Nov. 4, 1941...	(c) River Philip Pond, N.S.
	(o) 23	.....	.....	.....	.....	.....
K1180.....	15	37	Kelt.....	F.	Nov. 15, 1939...	River Philip Pond, N.S.
	(z) (u) 18	39	Clean....	F.	Nov. 7, 1941...	(c) River Philip Pond, N.S.
	(o) 21	.....	.....	.....	.....	.....
K1975.....	15	36	Kelt.....	F.	Nov. 6, 1940...	River Philip Pond, N.S.
	.....	.....	Clean....	F.	About Aug. 5, 1941.	Antigonish Harbour, N.S.
K2052.....	15	38	Kelt.....	F.	Nov. 6, 1940...	River Philip Pond, N.S.
	(z) (u) 14	39	Clean....	F.	1941...	(c) River Philip Pond, N.S.
	(o) 17	.....	.....	.....	.....	.....
K2057.....	6	27	Kelt.....	F.	Nov. 6, 1940...	River Philip Pond, N.S.
	.....	27½	Kelt.....	F.	May 19, 1941...	River Philip, N.S.
K2092.....	6½	30	Kelt.....	F.	Nov. 10, 1940...	River Philip Pond, N.S.
	.....	.....	Kelt.....	F.	May 13, 1941...	River Philip, N.S.
K2107.....	7½	31	Kelt.....	F.	Nov. 10, 1940...	River Philip Pond, N.S.
	8	31	Kelt.....	F.	May 14, 1941...	River Philip, N.S.
K2115.....	20	39	Kelt.....	F.	Nov. 10, 1940...	River Philip Pond, N.S.
	.....	.....	Kelt.....	F.	April 17, 1941...	River Philip, N.S.
K2117.....	12½	36	Kelt.....	F.	Nov. 10, 1940...	River Philip Pond, N.S.
	.....	36	Kelt.....	F.	May 4, 1941...	River Philip, N.S.
K2172.....	14	37	Kelt.....	F.	Nov. 11, 1940...	River Philip Pond, N.S.
	.....	.....	Kelt.....	F.	April 26, 1941...	River Philip, N.S.
K2265.....	15	36	Kelt.....	F.	Nov. 16, 1939...	River Philip Pond, N.S.
	24	40	Clean....	F.	July 10, 1941...	Monk Head, Antigonish County, N.S.
K2299.....	12	34½	Kelt.....	F.	Nov. 16, 1939...	River Philip Pond, N.S.
	(z) (u) 16	38	Clean....	F.	Nov. 8, 1941...	(c) River Philip Pond, N.S.
	(o) 21	.....	.....	.....	.....	.....
K2314.....	12	35	Kelt.....	F.	Nov. 16, 1939...	River Philip Pond, N.S.
	20	.....	Clean....	F.	June 1941...	Tors Cove, Newfoundland.
K2324.....	6	28	Kelt.....	F.	Nov. 16, 1939...	River Philip Pond, N.S.
	(z) (u) 11	34	Clean....	F.	Nov. 6, 1941...	(c) River Philip Pond, N.S.
	(o) 14	.....	.....	.....	.....	.....
K2339.....	12	35	Kelt.....	F.	Nov. 16, 1939...	River Philip Pond, N.S.
	(z) (u) 18	40	Clean....	F.	Nov. 7, 1941...	(c) River Philip Pond, N.S.
	(o) 21	.....	.....	.....	.....	.....

RECAPTURES, 1941—ATLANTIC SALMON

RIVER PHILIP, N.S.

Number	Weight (pounds)	Length (inches)	Condition	Sex	Date	1. Where liberated 2. Where caught
K2344.....	15 (z) (u) 20 (o) 23	35 40	Kelt..... Clean.....	F. F.	Nov. 16, 1939... Nov. 3, 1941...	River Philip Pond, N.S. (c) River Philip Pond, N.S.
K2362.....	6 14	28 34	Kelt..... Clean.....	F. F.	Nov. 16, 1939... July 24, 1941...	River Philip Pond, N.S. George Bay, Antigonish County, N.S.
K2364.....	11½ (z) (u) 14 (o) 18	33 38	Kelt..... Clean.....	F. F.	Nov. 16, 1939... Oct. 29, 1941...	River Philip Pond, N.S. (c) River Philip Pond, N.S.
K2365.....	8 (z) (u) 14 (o) 17	29½ 38	Kelt..... Clean.....	F. F.	Nov. 16, 1939... Nov. 3, 1941...	River Philip Pond, N.S. (c) River Philip Pond, N.S.
K2406.....	10 (z) (u) 14	31½ 36	Kelt..... Clean.....	M. M.	Nov. 16, 1939... 1941...	River Philip Pond, N.S. (c) River Philip Pond, N.S.
K2526.....	8 (y)	29½	Kelt.....	M.	Nov. 17, 1939... 1941...	River Philip Pond, N.S. Trinity Bay, off Great Heart Point, Newfoundland.
K2531.....	3½ 10	21½	Kelt..... Clean.....	M. M.	Nov. 17, 1939... July 7, 1941...	River Philip Pond, N.S. Head of Chedabucto Bay, Guys- borough County, N.S.
K2830.....	13	36	Kelt..... Kelt.....	F. F.	Nov. 14, 1940... May 8, 1941...	River Philip Pond, N.S. River Philip, N.S.
K2837.....	11	34 34	Kelt..... Kelt.....	F. F.	Nov. 14, 1940... May 2, 1941...	River Philip Pond, N.S. River Philip, midway between Collingwood and Oxford Junc- tion, N.S.
K2895.....	14	36	Kelt..... Kelt.....	F. F.	Nov. 14, 1940... June 10, 1941...	River Philip Pond, N.S. Northumberland Strait, off Ari- saig (one-half mile west of Arisaig breakwater), N.S.
K2949.....	9	31	Kelt..... Kelt.....	M. M.	Nov. 14, 1940... April 21, 1941...	River Philip Pond, N.S. River Philip, N.S.

NEW MILLS POND, N.B.

K2651.....	5½ (z) (u) 16	29 38½	Kelt..... Clean.....	F. F.	Nov. 1, 1939... Oct. 9, 1941...	New Mills Pond, N.B. (b) Jacquet River, N.B.
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SAINT JOHN RIVER, N.B.

K788.....	11 20	33	Kelt..... Clean.....	F. F.	Nov. 12, 1938... July 22, 1941...	Saint John Pond, N.B. Four miles south of Negro Head, Lorneville, N.B.
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Legend 1941—

- (a) Caught for second time for fish cultural purposes, Sept. 23–Nov. 11, 1941.
 (b) Caught for second time for fish cultural purposes, Oct. 9, 1941.
 (c) Caught for second time for fish cultural purposes, Oct. 5–Nov. 8, 1941.
 (d) Tagged and liberated without weighing or measuring.
 (e) Salmon caught, tagged and liberated above the Margaree Salmon Fisheries Association net, September 25; recaptured in association's net and placed in the Margaree Salmon pond on October 11, 1941.
 (f) Salmon tagged and liberated in Margaree River immediately above the Margaree Salmon Fisheries Association net, 1941.
 (u) Liberated with same tag attached.
 (y) Tag recovered while fishing for cod.
 (z) Weight after stripped.
 (o) Weight before stripped.

DEPARTMENT OF FISHERIES

RECAPTURES, 1942—ATLANTIC SALMON

MARGAREE RIVER, N.S.

Number	Weight (pounds)	Length (inches)	Condition	Sex	Date	1. Where liberated 2. Where caught
K205.....	(d)		Clean.....		Oct. 3, 1938...	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	24	38	Clean.....		Aug. 15, 1942...	Antigonish Harbour, N.S.
K1843.....	(d)		Clean.....	F.	Oct. 8, 1939...	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
			Clean.....	F.	..... 1942...	Near Clarenville, Newfoundland.
K3033.....	10	33	Kelt.....	M.	Dec. 4, 1940...	Margaree Pond, N.S.
	(z) (u) 15	37	Clean.....	M.	..... 1942...	(a) Margaree Pond, N.S.
K3041.....	7	31	Kelt.....	F.	Nov. 19, 1940...	Margaree Pond, N.S.
	16	36.6	Clean.....	F.	July 16, 1942...	Grand Etang, Inverness County, N.S.
K3063.....	17	40	Kelt.....	F.	Nov. 19, 1940...	Margaree Pond, N.S.
	27	40.9	Clean.....	F.	Aug. 11, 1942...	Belle Cote, about one and one-half miles northeast of Margaree Harbour, N.S.
K3125.....	9	31	Kelt.....	F.	Nov. 22, 1940...	Margaree Pond, N.S.
	20	36.2	Clean.....	F.	July 4, 1942...	Point Cross, Inverness County, N.S.
K3140.....	8	30	Kelt.....	F.	Nov. 22, 1940...	Margaree Pond, N.S.
	20	36.6	Clean.....	F.	July 20, 1942...	Terre Noire, Inverness County N.S.
K3158.....	7	29	Kelt.....	F.	Nov. 22, 1940...	Margaree Pond, N.S.
	20	36	Clean.....	F.	June 18, 1942...	St. John's Bay, near Boxey Newfoundland.
K3193.....	12	34	Kelt.....	F.	Nov. 29, 1940...	Margaree Pond, N.S.
	(z) (u) 16	40	Clean.....	F.	..... 1942...	(a) Margaree Pond, N.S.
K3204.....	17	38	Kelt.....	F.	Nov. 29, 1940...	Margaree Pond, N.S.
			Kelt.....	F.	May 10, 1942...	Long Marsh Pool, Margaree River, N.S.
K3206.....	12	35	Kelt.....	F.	Nov. 29, 1940...	Margaree Pond, N.S.
	23	39	Clean.....	F.	Aug. 4, 1942...	Beaton Point, Inverness County, N.S.
K3216.....	6	27	Kelt.....	M.	Dec. 4, 1940...	Margaree Pond, N.S.
	17½	34½	Clean.....	M.	Aug. 14, 1942...	George Bay, between Ogden Pond and Morristown Wharf, Antigonish County, N.S.
K3220.....	7	29	Kelt.....	M.	Dec. 5, 1940...	Margaree Pond, N.S.
	(z) (u) 14	36	Clean.....	M.	..... 1942...	(a) Margaree Pond, N.S.
K3222.....	8	30	Kelt.....	M.	Dec. 5, 1940...	Margaree Pond, N.S.
	16	35.4	Clean.....	M.	Aug. 15, 1942...	About one-half mile Northeast of Margaree Harbour, N.S.
K3223.....	7	31	Kelt.....	F.	Dec. 5, 1940...	Margaree Pond, N.S.
	22	35.8	Clean.....	F.	Aug. 3, 1942...	Black Rock, one mile west of Chimney Corner Point, Inverness County, N.S.
K3242.....	7	28	Kelt.....	M.	Dec. 5, 1940...	Margaree Pond, N.S.
	17½	35.4	Clean.....	M.	Aug. 15, 1942...	Terre Noire, Inverness County, N.S.
K3246.....	7	30	Kelt.....	F.	Dec. 5, 1940...	Margaree Pond, N.S.
	(z) (u) 13	37	Clean.....	F.	..... 1942...	(a) Margaree Pond, N.S.
K3248.....	6	31	Kelt.....	M.	Dec. 5, 1940...	Margaree Pond, N.S.
	24	37½	Clean.....	M.	June 9, 1942...	LaPointe, Inverness County, N.S.

RECAPTURES, 1942—ATLANTIC SALMON

MARGAREE RIVER, N.S.—*Concluded*

Number	Weight (pounds)	Length (inches)	Condition	Sex	Date	1. Where liberated 2. Where caught
K3255.....	14 20	39	Kelt..... Clean.....	F. F.	Dec. 5, 1940... July 15, 1942...	Margaree Pond, N.S. St. Andrews, Newfoundland.
K3269.....	(d)	38	Clean.....	F.	Sept. 24, 1941...	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	14	37	Kelt.....	F.	June 25, 1942...	LaPointe, Inverness County, N.S.
K3286.....	(d)	28	Clean.....	M.	Sept. 25, 1941...	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	8		Kelt.....	M.	July 4, 1942...	Second Forks Pool, Margaree River, N.S.
K3290.....	(d)	37	Clean.....	F.	Sept. 26, 1941...	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	12½		Kelt.....	F.	June 18, 1942...	Grand Etang, Inverness County, N.S.

RIVER PHILIP, N.S.

K1930.....	17	38	Kelt..... Clean.....	F. F.	Nov. 6, 1940... Oct. 23, 1942...	River Philip Pond, N.S. (c) River Philip Pond, N.S.
K1940.....	15 (z) (u) 19 (o) 27	37 39	Kelt..... Clean.....	F. F.	Nov. 6, 1940... 1942...	River Philip Pond, N.S. (c) River Philip Pond, N.S.
K1941.....	13 (z) (u) 15 (o) 19	37 40	Kelt..... Clean.....	F. F.	Nov. 6, 1940... 1942...	River Philip Pond, N.S. (c) River Philip Pond, N.S.
K1943.....	17 (z) (u) 22 (o) 30	37 39	Kelt..... Clean.....	F. F.	Nov. 6, 1940... 1942...	River Philip Pond, N.S. (c) River Philip Pond, N.S.
K1956.....	13 (z) (u) 16½ (o) 23	36 38	Kelt..... Clean.....	F. F.	Nov. 6, 1940... 1942...	River Philip Pond, N.S. (c) River Philip Pond, N.S.
K1964.....	16 (z) (u) 20 (o) 29	37 38	Kelt..... Clean.....	F. F.	Nov. 6, 1940... 1942...	River Philip Pond, N.S. (c) River Philip Pond, N.S.
K1968.....	12	35	Kelt..... Clean.....	F. F.	Nov. 6, 1940... Oct. 29, 1942...	River Philip Pond, N.S. (c) River Philip Pond, N.S.
K1980.....	12 (z) (u) 16 (o) 20	34 36	Kelt..... Clean.....	F. F.	Nov. 6, 1940... Oct. 29, 1942...	River Philip Pond, N.S. (c) River Philip Pond, N.S.
K2007.....	11 (z) (u) 15 (o) 20	34 36	Kelt..... Clean.....	F. F.	Nov. 6, 1940... Oct. 22, 1942...	River Philip Pond, N.S. (c) River Philip Pond, N.S.
K2018.....	14	36	Kelt..... Clean.....	F. F.	Nov. 6, 1940... Oct. 26, 1942...	River Philip Pond, N.S. (c) River Philip Pond, N.S.
K2026.....	17	38	Kelt..... Clean.....	F. F.	Nov. 6, 1940... Oct. 22, 1942...	River Philip Pond, N.S. (c) River Philip Pond, N.S.
K2112.....	11½ (z) (u) 22 (o) 30	36 40	Kelt..... Clean.....	F. F.	Nov. 10, 1940... 1942...	River Philip Pond, N.S. (c) River Philip Pond, N.S.
K2118.....	14½ (z) (u) 18 (o) 24	38 39	Kelt..... Clean.....	F. F.	Nov. 10, 1940... Oct. 25, 1942...	River Philip Pond, N.S. (c) River Philip Pond, N.S.
K2150.....	13	37	Kelt..... Clean.....	F. F.	Nov. 10, 1940... Oct. 26, 1942...	River Philip Pond, N.S. (c) River Philip Pond, N.S.
K2155.....	12	36	Kelt..... Clean.....	F. F.	Nov. 10, 1940... Oct. 26, 1942...	River Philip Pond, N.S. (c) River Philip Pond, N.S.
K2184.....	14 21½	36 37	Kelt..... Clean.....	F. F.	Nov. 11, 1940... 1942...	River Philip Pond, N.S. Pomquet Island Light, George Bay, N.S.

DEPARTMENT OF FISHERIES

RECAPTURES, 1942—ATLANTIC SALMON

RIVER PHILIP, N.S.—*Concluded*

Number	Weight (pounds)	Length (inches)	Condition	Sex	Date	1. Where liberated 2. Where caught
K2208.....	7 (z) (u) 14 (o) 17	30 36	Kelt..... Clean.....	F. F.	Nov. 11, 1940... 1942...	River Philip Pond, N.S. (c) River Philip Pond, N.S.
K2769.....	13 (z) (u) 19 (o) 25	36 38	Kelt..... Clean.....	F. F.	Nov. 11, 1940... 1942...	River Philip Pond, N.S. (c) River Philip Pond, N.S.
K2827.....	15	37	Kelt..... Clean.....	F. F.	Nov. 14, 1940... Oct. 24, 1942...	River Philip Pond, N.S. (c) River Philip Pond, N.S.
K2841.....	13	36	Kelt..... Clean.....	F. F.	Nov. 14, 1940... 1942...	River Philip Pond, N.S. Little Harbour, Pictou County, N.S.
K2848.....	12	34	Kelt..... Clean.....	F. F.	Nov. 14, 1940... Oct. 22, 1942...	River Philip Pond, N.S. (c) River Philip Pond, N.S.
K2903.....	15 (o) 23	37 37	Kelt..... Clean.....	F. F.	Nov. 14, 1940... Oct. 31, 1942...	River Philip Pond, N.S. (c) River Philip Pond, N.S.

Legend 1942—

- (a) Caught for second time for fish cultural purposes, Sept. 29-Oct. 17, 1942.
- (c) Caught for second time for fish cultural purposes, Sept. 25-Nov. 7, 1942.
- (d) Tagged and liberated without weighing or measuring, etc.
- (u) Liberated with same tag attached.
- (z) Weight after stripped.
- (o) Weight before stripped.

TAGGING AND RECAPTURE OF ATLANTIC SALMON 1913-1942

Atlantic salmon have been tagged and liberated, after they were stripped, at various points in Quebec, New Brunswick, Nova Scotia and Prince Edward Island where they were handled for fish cultural purposes from 1913 to 1941. Small numbers were also tagged and liberated without being stripped as were some spring kelt.

Consequently numbered metal and celluloid tags, double-bradded awls to make properly spaced holes in the fins, and wooden straight jackets to hold the larger fish, were used. Celluloid tags are more conspicuous but metal tags were preferred in the fish cultural work because they are stronger and the return from the sea of the tagged fish was not expected for one or more years. At first the tags were attached by passing pliable wires around the second and third rays of the dorsal fin close to the back of the fish, twisting the wires around one another and pressing the whole so that tags and wires lay closely against the fin without looseness or play. Some difficulty was experienced in doing this without pinching the fin rays. There was also some evidence of the tag cutting the fin. During later years double tags with a plate on either side of the fin were used, the wires being passed through the skin on the back of the fish as well as around the fin rays. With two tags or plates of the same size the wires go through the fin in a straight line and any pinching of the rays is readily avoided. Tagging was done by departmental officers who recorded the weight, length, sex, condition, date and place of liberation, and (starting in 1918) took a number of scales from the middle of the right side of the fish for age determinations. With the exception of those that were taken a second time by departmental officers for fish cultural purposes, recaptures were made and reported by commercial fishermen, dealers and anglers, who as an inducement were paid one dollar each for the return of tags with a number of scales from the left side of the fish and information as to its weight, length, condition, date, place and method of recapture.

Salmon ascend the rivers of the Maritime Provinces in two runs roughly designated as spring (early) or autumn (late). Some rivers have predominately "early" runs, some predominately "late" runs, and some both "early" and "late" runs. Tagging was undertaken primarily for the purpose of gaining reliable information in regard to the view that was advanced by some fishermen that these runs comprised different races and that the "early" salmon of any year and their progeny were always "early" and "late" salmon and their progeny were always "late"; also to obtain information in regard to the migrations or movements in the sea and the frequency in spawning of salmon of different rivers stripped and liberated at various points.

No change in the general period during which salmon made their appearance in so-called "late" rivers had followed the distribution therein of salmon stock from "early" rivers, indicating that water conditions (temperature, freshets, etc.) are the predominating factors that influence the ascent of Atlantic salmon in Canadian rivers. The numbers tagged and the recaptures reported have been listed in the Annual Reports on Fish Culture. These data were made available and were used by Doctor A. G. Huntsman in connection with his Atlantic salmon investigations:—

The Maritime Salmon of Canada, Huntsman, 1931.

Return of Salmon from the Sea, Huntsman, 1936.

Sea Movements of Canadian Atlantic Salmon Kelts, Huntsman, 1938.

As the titles of his reports indicate, Doctor Huntsman was concerned principally with the movements in the sea of the Atlantic salmon of Canada and considered all recaptures, irrespective of their condition, whether "kelt" or "clean".

As the Fish Cultural Branch is concerned primarily with the question of "early" and "late" races, only recaptures that according to available data had recovered from spawning or had been to sea after they were stripped and tagged are considered in the following summary:—

** Tadoussac Pond, Saguenay River, Que.*

Salmon for fish cultural purposes were caught in nets at Point Rouge and Barque Cove within the estuary of the Saguenay River, mostly during June and July (a few were caught some seasons during the latter part of May or during the early part of August), and were held in the retaining pond at Tadoussac until spawning time in the following autumn when they were stripped and released in late October and early November near where they were caught.

From 1913 to 1921 inclusive, with the exception of 1918, 641 tagged kelt were released. The recapture of six of these kelt that had recovered their condition, 0.9 per cent of the number tagged, was reported. All in the first instance were caught and impounded prior to August 1 and all recaptures reported were also taken prior to that date, with the exception of one taken at Henley Harbour, Labrador, about 700 miles distant, on August 5. The specific dates on which the salmon were caught in the first instance and placed in the retaining pond are not known but five of the six were recaptured between June 2 and July 5. Five were recaptured during the second and one during the first year after they were stripped. Of the five second-year fish, one was recaptured within seventy miles, three from one hundred and twenty to one hundred and thirty miles, and one at Beresford, N.B., on the south shore of the Bay Chaleur, about four hundred miles from the Saguenay River. The single first-year fish was recaptured at Henley Harbour, Labrador, about seven hundred miles distant from the point of liberation. The fish ranged in weight from eight to fifteen pounds, averaging twelve and one-third pounds.

Those recaptured at the greatest distance, Beresford and Henley Harbour, were thirteen pounds each after they were stripped.

The fish that travelled the greatest distance was recaptured during the first year after it was stripped and released.

** York River, Gaspé Basin, Que.*

Most of the salmon were caught from June to October near the mouth of York River, and were liberated about three miles up river after they were stripped and tagged. The tagged fish, 325 in all, were liberated in varying numbers from 1917 to 1921, with the exception of 1920. The recapture of two clean fish, 0.6 per cent of the number tagged was reported during the second year after they were stripped and released, one on July 19 and the other on September 10. The specific dates on which these fish were caught and impounded in the first instance are not known, but both were recaptured in prime condition and one was stripped for the second time. One, eight pounds after it was stripped, recaptured September 10, had doubled in weight and the other, recaptured July 19, had increased from seven to thirteen pounds between liberation and recapture.

New Mills Pond and Restigouche River, N.B.

Two thousand one hundred and thirty-four Atlantic salmon were tagged and released after they were stripped in the Restigouche River and tributaries and at the New Mills salmon retaining pond, Bay Chaleur, in varying numbers from 1913 to 1939.

The New Mills pond is located at New Mills, on the Bay of Chaleur, about thirty miles from Tide Head on the Restigouche River. The salmon tagged and released in the Restigouche River and its tributaries, excepting those released at Tide Head, were caught during the late summer and early autumn. The New Mills salmon were purchased from the commercial fishermen of the district, mostly during the month of June. In 1939 the New Mills purchases were supplemented by salmon caught at Jacquet and Benjamin Rivers during September and October. Seventy-three were tagged and released at Tide Head, Restigouche River, 172 in the Kedgwick, 300 in the Matapedia, 19 in the Little Main (Restigouche) and 1,570 in the Bay Chaleur, at New Mills, making a total of 2,134 salmon. From these groups, the recapture of 28 clean fish, 1.3 per cent of the number tagged, has been reported, 25 in the second year and 3 in the first year after they were stripped. Twenty-four were taken in the river and bay, of which 22 were second-year and 2 first-year fish. One second-year fish was recaptured in the Miramichi River, 200 miles distant, 1 (tagged in the Kedgwick River) at Placentia Bay, Newfoundland, 600 miles distant, and one at Jacquet River, 10 miles distant. The third first-year fish was recaptured at Tub Harbour, Labrador, 700 miles distant. As was the case with the Saguenay group the salmon that was recaptured farthest from where it was liberated was a first-year fish. One second-year fish was recaptured almost as far away, at Placentia Bay, Newfoundland.

Two hundred and twenty-eight kelt caught in the Restigouche and its tributary the Upsalquitch River during the spring of 1921 were tagged and released. During the following year two fish, 0.86 per cent of this group were reported from the Restigouche River. Altogether thirty recaptures have been reported from these several groups of which 25 or 83.3 per cent were second-year fish and five or 16.7 per cent were first-year fish. The Tide Head and New Mills salmon were caught early in the season. Of seventeen recaptures from these groups, sixteen (94.1 per cent) were second-year fish and one (5.9 per

cent) was a first-year fish, all were "early" when tagged and recaptured. The period during which those tagged and liberated at points other than Tide Head in the Restigouche River and tributaries entered that river is not known as some were caught well up stream shortly before the spawning season and some were spring kelt. Two Jacquet River fish that were caught in the first instance late in the season were recaptured. One, weight $6\frac{1}{2}$ pounds after it was stripped, was taken at Tub Harbour, Labrador, on July 22 of the following year and the other at Jacquet River two years later.

Jacquet River is ten miles and Benjamin river one mile seaward from New Mills.

Nipisiguit River, N.B.

Five hundred and eighty-two Atlantic salmon were tagged and released below Grand Falls, Nipisiguit River, New Brunswick, in varying numbers from 1924 to 1927, inclusive. The recapture of eight (1.37 per cent of the number tagged) has been reported, two in the first and six in the second year after they were released. The Nipisiguit flowing into Bay Chaleur forty miles seaward from New Mills is a fairly "early" salmon river, but the above mentioned fish were taken for fish cultural purposes during the late summer and early autumn. The dates on which they entered the river the years they were tagged are not known. The two first-year fish, five, and sixteen and one-half pounds, were recaptured in the Bay Chaleur about six miles from the mouth of the Nipisiguit on August 1 and 3. Two of the six second-year fish were recaptured within six miles of the mouth and four in the Nipisiguit River, five during July and August and one in October during egg collecting operations, where it had previously been caught, tagged and released. The eight recaptures ranged from three to sixteen and one-half pounds (average eight pounds) when released. All recaptures were taken in the river or in Bay Chaleur within six miles of the mouth of the river.

Miramichi Salmon Retaining Pond, N.B.

Varying numbers of Atlantic salmon were tagged and liberated at South Esk in the Miramichi River about twenty miles above the estuary after they were stripped each year from 1913 to 1924, and in 1928 and 1937. Two thousand seven hundred and twenty-one were tagged and the recapture of 48 fish that had been to sea, or 1.76 per cent of the number tagged, has been reported, 8 in the first, 35 in the second, 2 in the third and 3 in the fourth year after they were stripped and liberated. Of the 8 first-year fish, ranging in weight from $6\frac{1}{2}$ to 17 pounds, two, weighing 10 and $6\frac{1}{2}$ pounds, were recaptured at Bonne Esperance, Quebec, and at Black Duck Cove, St. Barbe District, Newfoundland, 500 miles distant, on July 25 and June 24, respectively, and 5, one in July, three in August and one after September 8 in the Miramichi River, and one in October in Cains River, tributary to the Miramichi.

Of the 35 second-year fish, 2 weighing 9 pounds each were recaptured at Trinity Bay, Newfoundland, 800 miles distant, on June 8; 1, 12 pounds at Richibucto Harbour, N.B., about seventy-five miles distant, on June 16; two, 12 and 11 pounds at Escuminac Point, forty-five miles distant, on June 16 and July 8; 16 ranging in weight from 6 to 19 pounds, average 11.4 pounds, were recaptured in the Miramichi, 2 in June, 2 in July, 8 in August, 1, 19 pounds, in Cains River (noted for its well-mended spring kelt), a tributary of the Miramichi in May, 1, 16 pounds, in September, 1, 8 pounds, in the autumn and 1, 16 pounds (kelt), in May, and 13 ranging in weight from 7 to $14\frac{1}{2}$ pounds, average 10.1 pounds, after September 1 where they had previously been stripped, tagged

and liberated. The place of recapture of one second-year "early" fish is unknown. It was shipped by W. S. Loggie of Chatham, N.B., to Messrs. Baxter & Son of Billingsgate, London, England, and reported to the Department by the President of the English Board of Agriculture and Fisheries, through the Secretary of State for the Colonies.

Two were reported in the third and 3 in the fourth years after they were stripped. The 2 third-year fish were tagged and released in the autumn of 1937 and were recaptured in the Miramichi River on May 22 and 27, 1940. The 3 fourth-year fish were tagged and released in the autumn of 1913 and were reported, 1 in June and 2 in July, 1917.

As was the case at some other rivers, the Miramichi recaptures taken farthest from where they were liberated were not the largest fish. They were also taken early in the season, viz., Trinity Bay, Newfoundland, 2 fish, 9 pounds each, taken June 8, 800 miles distant; St. Barbe, Newfoundland, one fish, 6½ pounds June 24, 500 miles distant, and Bonne Esperance, Quebec, one fish, 10 pounds July 25, 500 miles distant. Other recaptures were made at Richibucto in June; Escuminac Point, 1 each in June and July, 19 first and second year fish in the Miramichi River, 1 second-year kelt in May, 2 in June, 3 in July, 11 in August, 1 in September and 1 in the autumn. Actually 24 salmon, including the 2 third and the 3 fourth-year fish, were reported from the Miramichi. The 2 third-year fish were May kelt and the 3 fourth-year fish are doubtful. Of the two Cains River salmon, one was a second-year May kelt and the other, a first-year fish, was recaptured in October some distance above the point in the Miramichi where it had been tagged and released. Fourteen were taken for the second time in the traps operated for fish cultural purposes after September 1.

If the 2 third-year, the 3 fourth-year, the 2 Cains River and the 1 second-year May kelt are disregarded, the remaining 40 were recaptured, 7 in June, 5 in July, 11 in August, 1 reported from London, England (an "early" fish) and 16 after September 1 mostly where they had been taken previously.

All these salmon had originally been caught as "late" fish but 60 per cent were recaptured during June, July and August. The percentage is 64 if the 2 third-year and 3 fourth-year fish are included and the two May kelt are disregarded.

The recapture as "early" fish of 60 per cent or more salmon does not support the contention that the "early" and "late" salmon of the Miramichi are distinct or separate races but that conditions and environment as opposed to heredity are the predominant factors that influence or govern the seasons (early or late) during which they ascend from the sea. That the earliest runs are composed predominantly of females and that males appear later in the season also supports the single race theory, as with the sex ratio that prevails in the Miramichi the eggs of the "early" females must be fertilized by "late" males.

During the months of May and June, 1921, all of the salmon taken in one of the regular commercial nets operated near South Esk in the Miramichi River were weighed, measured, and their scales studied by Doctor A. G. Huntsman of the Fisheries Research Board. One hundred and sixty-nine fish were taken in this net during May and June. The weight groups were as follows:

5 to 6 pounds, inclusive	5 fish
6½ to 8 " "	29 "
8½ to 10 " "	98 "
10½ to 12 " "	33 "
12½ to 14 " "	3 "
15½ pounds	1 "

Doctor Huntsman found, that of the total of 169 salmon only 2, less than 1.2 per cent, had previously spawned; 167 showed no trace of having spawned and were maiden fish entering fresh water for the first time. All of this number (167) had spent only two winters in the sea. They showed a variable amount

of growth for the current season of 1921, about one-third showing no growth whatever. In no case was the recent growth very great, as might be expected in fish caught so early in the season. The remaining 2 fish had spawned, having spent two winters in the sea previous to spawning and an uncertain length of time after spawning. Of the total 169, 128 had spent three years in fresh water, 35 had spent two, 5 had spent four, and 1 had spent one year before going to sea.

Again in 1922 all the salmon taken in one commercial net in the South Esk District were measured, weighed, their sex determined, and a number of scales taken from each fish. Fishing commenced on May 29 and ended on August 15, a total of 261 salmon being taken. From May 29 to June 15 inclusive 76 salmon were taken, all of which were females. The first male salmon was caught on June 16 and weighed 13 pounds. Two more males were caught on June 20 each weighing $3\frac{1}{4}$ pounds. On June 20, 104 salmon had been caught, namely 101 females and 3 males, the latter weighing 13, $3\frac{1}{4}$ and $3\frac{1}{4}$ pounds. From June 16 to 30, 82 salmon were caught, 62 females and 20 males. Of the 20 males, 1 weighed 13 pounds, 2 weighed 4 pounds, 2 weighed $4\frac{1}{2}$ pounds and 15 were under 4 pounds. If the salmon weighing $4\frac{1}{2}$ pounds and under are regarded as grilse, the total catch to June 30 of this one commercial net which may be regarded as representative of the district was 138 females, 1 male and 19 grilse.

From July 1 to 31, 87 salmon were caught, 63 females and 24 males. Eleven of the males were $4\frac{1}{2}$ pounds and under, 1- $5\frac{1}{2}$, 1-6, 2-8, 2-9, 1- $9\frac{1}{2}$, 2-10, 2-11, 1-12 and 1-13 pounds. Again, if salmon of $4\frac{1}{2}$ pounds are regarded as grilse, the catch during this period was 63 females and 13 males ranging from $5\frac{1}{2}$ to 13 pounds and 11 grilse. From August 1 to 15, 16 were caught, 11 females and 5 males, the latter weighing 8, 12, 15, 16 and $17\frac{1}{2}$ pounds. The salmon netting season in the Miramichi district extends from May 15 to August 31 inclusive. During this period the catch of this net comprised: female salmon 81.2 per cent, males over $4\frac{1}{2}$ pounds 7.3 per cent, and grilse or small males $4\frac{1}{2}$ pounds and under 11.5 per cent.

In 1934 salmon were purchased from the commercial fishermen of the vicinity and retained in pound-net pots at the mouth of the Bartibog River at the head of Miramichi Bay. These are estuarial nets and purchase was limited to salmon of an estimated weight of 9 pounds or over. The first salmon was impounded on June 14 and from that date until June 30, 111 were secured, with 6 in July, making a total of 117. On September 4, 97 of the 117 were transferred to the salmon retaining pond at South Esk. Of this number 81, or 83.5 per cent were females and 16, or 16.5 per cent, were males. In 1935 salmon were again purchased from the commercial fishermen of the Bartibog district, 262 being secured between May 24 and June 14, inclusive. On August 31 one hundred and seventy-seven of these were transferred to the pond at South Esk and of this number 146 or 82.5 per cent were females and 31 or 17.5 per cent were males. There was a certain measure of selection due to the estimated size limit of 9 pounds, but the sex ratio varies very little from what it did for the total catch of the net in 1922.

The early run of all rivers, particularly the Miramichi, has been thoroughly fished and the late run has been protected. There has been no apparent change beyond periodical fluctuations in either runs, the early run, which has been exploited continuing, in comparison with the late run, as good as it ever has been. If the "early" and "late" runs were made up of different races the fishing of the "early" and the protecting of the "late" would be reflected in the present size of these runs.

Cains and Tabusintac Rivers, N.B.

Twenty of the well-mended kelt of Cains River, tributary to the Miramichi River, were tagged and released during 1927. The recapture of only one has been reported. This fish was tagged and released in Cains River on May 1 and it was reported a month later on June 3, near Derby Junction, Southwest Miramichi, thirty miles nearer the sea.

Thirty-two kelt, twenty-four tagged in May and eight (stripped) in October, were released in the Tabusintac River which flows into the Gulf of St. Lawrence, near the northerly entrance to Miramichi Bay. None of these have been reported.

Saint John River, N.B.

Salmon were purchased for many years from the weir fishermen of Saint John Harbour, where the regular netting season extends from May 1 to August 15, and held from the time they were caught until the following autumn in a tidal pond in Little River which flows into Courtenay Bay.

From 1913 to 1924, 1,215 kelt in numbers varying from 50 to 196 annually, were tagged and liberated in Little River below the retaining pond. Twenty recaptures, 1.64 per cent of this number were reported, 5 in the first, 14 in the second and 1 in the third year after they were liberated. One (third-year fish) was recaptured in April, 12 in June, 5 in July, 1 in August, and 1 was purchased from the weir fishermen of Saint John Harbour prior to August 15, as was done when this fish was tagged one year previously.

After an interval of six years 806 were tagged in 1930. The recapture of 18 or 2.23 per cent was reported, 5 in the first, and 13 in the second year after they were liberated. Six were recaptured in May, 4 in June, 6 in July, 1 in August, and 1 in September at Hartt's Island Pool about 85 miles up river from Saint John Harbour.

After a second interval of seven years 677 were tagged in 1937 and 1938. The recapture of 24 or 3.54 per cent of this number has been reported, 18 in the first, 5 in the second, and 1 in the third year after they had been stripped and liberated. One was recaptured in April, 4 in June, 13 in July, 1 prior to July 12, 4 in August, and 1 in October at Crow Head, Twillingate, Newfoundland. The specific date on which one salmon was captured is unknown but it was reported by letter dated July 12. The percentage of recaptures reported increased progressively from the first to the third groups. While second-year fish constituted 70 per cent and 72 per cent of the first and second groups respectively, they constituted only 21 per cent of the third group. The first group averaged 7.4 pounds, the second 8.5 pounds and the third 10.4 pounds each after they were stripped the years that they were liberated.

Altogether 2,698 tagged kelt were released and 62, or 2.29 per cent were reported. The returns from the Saint John River are strikingly different from the returns from all other rivers where tagging was done, inasmuch as with one exception all salmon were recaptured within a small area of the Bay of Fundy between the mouth of the Saint John River and Point Lepreau (a distance of about thirty miles) in Saint John Harbour, Saint John River and tributaries, including the Tobique, 200 miles from the sea. The exception, weight 10½ pounds, was recaptured at Crow Head, Twillingate, Newfoundland, approximately 1,100 miles distant on October 31, 1939, almost one year after it was stripped, tagged and released in Saint John Harbour. Only one of the many salmon tagged and released at other points was recaptured in the Saint John River zone, namely one salmon tagged and released in the Nictaux River, N.S., on the southerly side of the Bay of Fundy, was recaptured at Point Lepreau, N.B., on the northerly side of the Bay.

These returns indicate that the Saint John River stock of Atlantic salmon might be regarded as a self-contained unit that has its sea life within a comparatively small area of the Bay of Fundy a short distance from their home river.

Practically all of these salmon in the first instance were caught prior to August 15 in the Saint John Harbour weirs and were liberated in Little River about 200 yards from Courtenay Bay which is practically normal sea water. Of the 62 recaptures reported 60 or over 96·7 per cent were taken during the same period. Of the remaining 2, one was recaptured in September at Hartt's Island Pool, in the Saint John River, about eighty-five miles upstream from where it was liberated, and the other, which was the greatest wanderer of the Saint John River group, a first-year fish, was taken in Newfoundland waters in October about 1,100 miles distant.

In response to the requests of local interests who were strongly of the opinion that angling in the upper Saint John River and several of its tributaries during late June and early July might be improved by such action, an average of over two hundred and thirty thousand Atlantic salmon fingerlings, Restigouche River early stock, were distributed in the Saint John system for five successive seasons. Approximately twenty-four per cent of these fingerlings were marked by the removal of the adipose and one of the side fins. Commercial fishermen, anglers, provincial officers and Fish and Game Protective Associations were advised and urged to report the return from the sea of any of these marked fish. As an inducement one dollar was offered for the scars left by the removal of the fins, several scales, and information as to the weight, length, date, place, and method of capture.

Up to the present only 38 marked salmon have been reported with identifying data; 1 from the drifting area off Dipper Harbour on July 1; 22 from Saint John Harbour from June 17 to July 31; 7 from the lower river within ten miles of Saint John Harbour from May 26 to August 8, 6 from the Saint John River above Fredericton, viz., 4 June 19 to 22, 1 each on July 25 and September 9, 1 on August 2 from the Tobique River, and 1 on July 5 from the Salmon River. While the number of marked salmon reported is small, that number does not indicate that the salmon angling in the upper river above Fredericton was improved during late June and early July by the distribution of the Restigouche stock as 79 per cent were taken in Saint John Harbour or within a short distance of the harbour during the time that the commercial fishing in that area is usually at its best.

Nictaux River, N.S.

Atlantic salmon were trapped from May to November at the head of the fishway at Nictaux Falls and were held in the power canal or power pond at that point until spawning time each year from 1931 to 1938 inclusive. Each autumn during this period, with the exception of 1935, kelt were tagged and liberated below the falls. In all, 895 kelt were tagged, and the recapture of 37 or 4·13 per cent of this number after they had recovered from spawning has been reported, 15 in the first, 21 in the second and 1 in the third year after they were tagged and released. The specific dates on which the salmon entered the trap at the head of the fishway are not known but the majority were "early" fish. The 37 recaptures were reported, 19 from the Nictaux and Annapolis Rivers, 3 from the Port Maitland mackerel traps off Yarmouth County, Nova Scotia, 1 from Point Lepreau, New Brunswick, on the northerly side of the Bay of Fundy, 12 from Newfoundland and 2 from Labrador waters. All of the Nictaux and Annapolis recaptures, viz., 19, or 51·3 per cent of the total reported were taken during the second year after they were tagged. They weighed from 4½ to 8½ pounds and their average was 6·4 pounds after they were stripped. The Port Maitland fish, 3 or 8·1 per cent of the total recaptures, weighed 5, 5 and 10

pounds, or an average of 6·7 pounds. They were taken during the first year after they were released as was the Point Lepreau fish which weighed 7 pounds. The Point Lepreau is the only salmon tagged by the Fish Culture Service elsewhere than at the Saint John salmon retaining pond, that was recaptured in New Brunswick waters on the northerly side of the Bay of Fundy.

Fourteen, or nearly 38 per cent of the total were recaptured, 12 in Newfoundland and 2 in Labrador waters. Eleven of the 14 were taken during the first, 2 during the second, and 1 during the third year after they were stripped and released. The 14 ranged from 3 to 9 pounds and averaged 5·6 pounds. These fish as a group were below the average weight of the salmon recaptured in the Annapolis River system, at Port Maitland and at Point Lepreau in the proportion of 5·6 to 6·4, 6·7 and 7 pounds and, in so far as these groups are concerned, it was not the largest fish that went farthest from their "home" waters or the river where they were tagged.

All of the 19 salmon recaptured in the Nictaux and Annapolis rivers (not a great distance from where they were tagged and released) were taken during the second year, while 15, or slightly over 83 per cent of the remaining 18 recaptures, were made during the first year, from 100 to 1,100 miles from where they were tagged and released. Of this group of 18, 2 were recaptured during the second and 1 during the third year after their release. One second-year fish, weight 6 pounds, was recaptured on the Labrador Coast nearly 1,900 miles from the Nictaux River.

Allen Lake, Burns Point, Port Maitland, N.S.

Twenty-five salmon caught in mackerel traps off Burns Point, Port Maitland, Yarmouth County, N.S., were tagged and liberated during June, 1925. The recapture of 3, or 12 per cent has been reported, one at the same place ten days later, another at Musquodoboit, about two hundred miles eastward along the south shore of Nova Scotia, after twenty-five days, and a third at Moisie River, Quebec, on the north shore of the Gulf of St. Lawrence, about eight hundred miles distant by the most direct route, after forty-two days.

Two hundred and thirty-nine salmon caught in the Port Maitland traps, mostly in June, 1929 and 1930, were held in Allen Lake, stripped, tagged and liberated as kelt in October, November and December of those years. The recapture one year later of only one, ·4 per cent, has been reported from the Mersey River, about one hundred miles eastward along the south shore of the province.

It is not known from what rivers these salmon had come as they were caught some distance off shore, but the points where recaptures were made indicate a movement from Port Maitland eastwardly along the southerly shore of the province. Three of the four clean fish reported (two tagged as clean spring fish and one as an autumn kelt) were taken from one hundred to eight hundred miles in that direction. The fourth (clean) was caught ten days later in one of the Port Maitland traps near where it had been released.

The Allen Lake kelt was two pounds, and those tagged at the traps in early June (clean) were eight, eleven and twenty pounds, the heaviest being recaptured at Moisie River, Quebec. All were "early" fish the years that they were tagged. The heaviest Port Maitland fish was taken farthest from where it was liberated. Three kelt weights 10, 5 and 5 pounds tagged and liberated in the Nictaux River, a tributary of the Annapolis River, N.S., one each in 1934, 1936 and 1938, were recaptured one year later in the aforementioned mackerel traps on July 8, 1935, June 15, 1937 and May 26, 1939.

Sackville River, N.S.

Salmon are caught during the late summer and autumn at the mouth of the Sackville River, and are retained in the immediate vicinity until spawning time. Varying numbers of these salmon were tagged and released after they were stripped in 1932, 1933, 1934, 1936 and 1937. Six hundred and thirty-seven salmon in all were tagged and released and the recapture of 4.2 per cent of this number or 27 clean salmon has been reported, 15 or 55.5 per cent during the first, 11 or 40.7 per cent during the second, and 1 during the fourth year after they were stripped and liberated. Of 15 first year fish, 9 ranging in weight from $2\frac{3}{4}$ to $11\frac{1}{2}$ pounds and averaging 6.4 pounds were recaptured at the mouth of the Sackville River where they had been tagged and released; 4 ranging in weight from 2 to $8\frac{3}{4}$ pounds and averaging 6.6 pounds were recaptured in Bedford Basin; 1 weighing $5\frac{3}{4}$ lbs. was recaptured at Terre Noire near the mouth of the Margaree River; and 1 weighing $5\frac{1}{2}$ pounds at Lawn, Newfoundland. These last two were recaptured at approximately 250 and 500 miles distant respectively from where they were released. Of the 11 second-year fish, 5 ranging from 2 to $14\frac{3}{4}$ pounds and averaging 7.1 pounds were recaptured at the mouth of the Sackville River; 3 in Bedford Basin and 1 at Herring Cove, Halifax Harbour, ranging in weight from 3 to $6\frac{3}{4}$ pounds and averaging 4.4 pounds; 1 weighing 5 pounds at Drumhead, Halifax County, 100 miles distant, and 1 near Margaree Harbour weighing $10\frac{3}{4}$ pounds, 250 miles distant. One fourth-year salmon weighing $9\frac{1}{4}$ pounds tagged and liberated in 1933, was reported from Petit de Grat, Richmond County, 150 miles distant in 1937. In all the tagging done by this Department, fourth-year fish have been reported on five occasions only, that is, one tagged at the Sackville River, N.S., one tagged at Margaree Harbour, N.S., and three tagged at the Miramichi Pond, N.B.

In general, the recaptures were made at progressively later dates the nearer the fish were recaptured to the Sackville River, where they were stripped and released. The precise date on which the recapture was made at Lawn, Newfoundland, is not known but it was reported by letter dated August 25. The Margaree, Terre Noire, Petit de Grat, and Drumhead group (100 to 250 miles from point of liberation) were recaptured, one in May, two in June and one in July. The Bedford Basin (into which the Sackville River flows) group were recaptured, three in July, three in August, and one in September. The Herring Cove, Halifax Harbour, fish was recaptured in June. Sackville River group of 14 were recaptured from late August into the early part of November. All were liberated as late fish; twelve, or 44.4 per cent, were recaptured as early fish.

The Sackville is a "late" salmon stream. Salmon were "late" when they were tagged and were also "late" when they were recaptured there. Those recaptured at any distance from the Sackville River were, however, taken mostly in May, June and July and, consequently, contributed to the earliest fishing.

The recapture, $5\frac{1}{2}$ pounds, made at the greatest distance from point of liberation was a first-year fish.

River Philip, N.S.

Salmon are trapped in River Philip at the old power dam near Oxford during the late summer and autumn. The trap closes the river to the ascent of fish.

Varying numbers of salmon were tagged and released above the dam after they were stripped in 1924, 1929, 1930 and annually from 1936 to 1940, inclusive. In all, 2,472 salmon kelt were tagged and the recapture of 56 clean fish, 2.26 per cent of the number tagged, has been reported, six during the first and 50 or 89.3 per cent during the second year after they were stripped. Of the 6 first-year fish, 1 weighing 7 pounds was recaptured at Fishing Ship's Harbour, Labrador; 1 weighing $11\frac{1}{2}$ pounds at Placentia Bay, Newfoundland; 1 weighing 13 pounds

at Friar Head, near Margaree Harbour; 1 weighing 15 pounds at Antigonish Harbour; 1 weighing 14 pounds at Arisaig, Pictou County, and 1 weighing 15 pounds in River Philip at the dam where it had been tagged and released. Of the 50 second-year fish, 5 ranging from 6 to 17 pounds and averaging 10·8 pounds were taken in Newfoundland waters; 1 weighing $3\frac{3}{4}$ pounds at Chedabucto Bay, Guysborough County; 4 weighing from 6 to $16\frac{1}{2}$ pounds and averaging 12·9 pounds were recaptured in George Bay, Antigonish County; 1 weighing 7 pounds at Big Island and 1 weighing 13 pounds at Little Harbour, Pictou County, and 38 weighing from 5 to 17 pounds and averaging 12·3 pounds at the dam in River Philip, where they had been tagged and released.

River Philip is a "late" salmon stream. The fish cultural trap is not set until late September and it is usually operated into the middle of November. Most of the salmon are taken during October. During the last three years, the heaviest catches were made between October 20 and November 13. The tagging is done mostly in November after the salmon are stripped. The specific dates on which four of the salmon were recaptured is not known. The tag of one was recovered while fishing for cod at Trinity Bay, Newfoundland, and reported by letter dated August 31. One caught at St. Anthony, Newfoundland, was reported by letter dated August 6 and one each caught at Little Harbour and George Bay, N.S., were reported by letter dated July 7. Of the remaining 52, 2 were recaptured at Bonavista Bay, Newfoundland, weighing 6 and 11 pounds, about 800 miles distant in June, 1 at Fishing Ship's Harbour, Labrador, weighing 7 pounds, about 1,000 miles distant in July; 1 at Tors Cove, Newfoundland, weighing 12 pounds, 600 miles distant, also in June; 1 at Placentia Bay, Newfoundland, weighing $11\frac{1}{2}$ pounds, 500 miles distant in July; 1 at Friar Head, near Margaree Harbour, weighing 13 pounds in June; 1 at Chedabucto Bay, Guysborough County, weighing $3\frac{3}{4}$ pounds in July; 3 in George Bay weighing $16\frac{1}{2}$, 6 and 15 pounds, 1 in June and 2 in July; 1 at Antigonish Harbour weighing 15 pounds in August; 1 at Big Island weighing 7 pounds in July; 1 at Arisaig, Pictou County, weighing 14 pounds in June, and 39 in River Philip weighing from 5 to 17 pounds from late September to early November.

The seven salmon recaptured in Newfoundland and Labrador waters from 500 to 1,000 miles distant from the point of liberation were taken 3 during June, 2 during July and 2 presumably in August; 9 of the 10 recaptures along the shores of Inverness, Guysborough, Antigonish and Pictou Counties were taken during June and July, and the tenth during August. Apparently the weight of the fish when liberated did not govern their movement from point of liberation as recaptures ranging from 6 to 17 pounds were made in Newfoundland and Labrador waters.

While River Philip is definitely a "late" stream and the spawning run is "late" when it reaches the trap at Oxford 12 miles from the mouth of the river, 30 per cent of the recaptures of "clean" fish reported were taken, mostly in June and July, and had contributed to the "early" commercial fisheries along the coasts of Nova Scotia, Cape Breton, Newfoundland and Labrador for varying distances up to 1,000 miles from where they were tagged and liberated.

Margaree Salmon Retaining Pond, Margaree Harbour, N.S.

From 1913 to 1924 a total of 1,431 salmon that had been stripped, an average of 119 each year, were tagged and liberated at Margaree Harbour. From this group the recapture of 55 clean fish or 3·8 per cent has been reported. During 1928, 1930, and from 1933 to 1941, a further total of 2,909 fish were tagged, or an average of 264 annually during those years.

On October 3 and 4, 1938, 200 salmon were tagged and liberated above the net in which they were caught before they were stripped. The recapture of 11 or $5\frac{1}{2}$ per cent was reported, 3 in the net in which they had been caught

previously, and 8 or 4 per cent by anglers in the river pools from six to seven and one-half miles above the net, in from two to ten days after they had been liberated. From September 19 to October 9, 1939, 216 were similarly tagged. Thirty-eight or 17.6 per cent were recaptured, 27 in the net for the second time and 11 or 5.1 per cent by anglers six to twenty miles upriver, in from three to sixteen days. From September 23 to 28, 1941, 39 were tagged and liberated. Four or 10.2 per cent were recaptured, 1 a second time in the net and 3 or 7.7 per cent from six to twelve miles upriver in from nine to sixteen days later.

The handling to which these fish were subjected in taking them from the net, transferring them to pontoons and tagging them apparently did not militate against their value to anglers to any great extent as they rose to the fly such a comparatively short time later.

Exclusive of these three groups, 1938, 1939 and 1941, 3,885 salmon were tagged and liberated. From this number 178 clean fish, 4.58 per cent of the number tagged, have been reported, 29 or 16 per cent in the first, 146 or 82 per cent in the second, 3 in the third years after they were tagged and liberated. The recaptures of 9, 2 in the first, 5 in the second, 1 in the third and 1 in the fourth year after they were liberated without being stripped, above the net have also been reported, in addition to those that were taken in the harbour or rivers within a few days. The single fourth-year fish was released October 3, 1938, and recaptured at Antigonish Harbour August 15, 1942. Of the third-year fish, one was released at Margaree Harbour, November 21, 1919, and recaptured at Twillingate, Newfoundland, June 12, 1922. One was released at Margaree Harbour, October 8, 1939, and reported from Clarendville, Newfoundland, in 1942.

Twenty-five or 13.4 per cent of recaptures were reported, 24 from Newfoundland and 1 from Labrador waters, 6 in the first, 17 in the second and 2 in the third years after they were stripped; 1 in May, 12 in June, 8 in July and 2 in August. The dates on which 2 were caught is not known but they were reported by letters dated June 13 and September 24.

Exclusive of the salmon that were recaptured upriver a short time after they were tagged in 1938, 1939 and 1941, and including 9 of these fish that had returned to sea after they were tagged, a total of 187 recaptures have been reported, 31 in the first, 151 in the second, 4 in the third and 1 in the fourth years after they were released.

One salmon tagged and released without being stripped on October 4, 1938, was recaptured the following summer at Charge Du Lac Point, La Tabatiere, Quebec, on the north shore of the Gulf of St. Lawrence, about one hundred miles from the entrance to the Strait of Belle Isle.

One was recaptured in August at St. Ann's Bay, one in June at Ingonish, one at Aspy Bay also in June, all on the Atlantic side of Cape Breton Island and one at South Manchester, Guysborough County, in July. The remaining recaptures were distributed along the Gulf of St. Lawrence Coast from Pleasant Bay, Inverness County, to Fergusons Point, Pictou County. The majority were taken during July and August with by far the largest concentration at Margaree Harbour and vicinity. The specific dates on which five were recaptured are not known but 1 was reported in June, 2 in August, 1 in September (found in salt barrel) and 1 was caught during the summer, all presumably early fish. Of the remaining 182 two were taken in May, 25 in June, 81 in July, 41 in August, 2 in September, and 31 at Margaree Harbour where they were tagged and released in the first instance. Two of those recaptured at the harbour in 1935 and found in the pond at stripping time are presumed to be late run, and the remaining 29 were caught 4 prior to July 28 and 25 after August 24.

While all these salmon were definitely "late" when first caught, 84 per cent were recaptured as "early" and 16 per cent as "late" fish. Had these late fish (27) not been intercepted by the trap operated for fish cultural purposes at Margaree Harbour they would have been available to contribute to the angling

in the Margaree River to the same extent as did those that were tagged and released at the same trap in 1938, 1939 and 1941.

The months during which these salmon were caught, the years that they were tagged, and the months during which over 84 per cent were recaptured does not support the view that more than one race of Atlantic salmon resort to Canadian waters and that the "late" fish of any year and their progeny are always "late" fish.

Morell River, P.E.I.

Salmon for fish cultural purposes are caught during the late summer and autumn at the mouth of the Morell River and are retained in the immediate vicinity until spawning time. Varying numbers of these fish were tagged and liberated as they were stripped each year from 1918 to 1924, with the exception of 1920, and again in 1929, 1930 and 1937. A total of 750 were tagged and nearly 2·7 per cent, or twenty clean fish have been reported, seven during the first and thirteen during the second year after they were tagged and released. Of the seven first-year fish ($3\frac{3}{4}$ to 15 pounds, average 8·5 pounds) three were recaptured at the mouth of the Morell River where they were caught and released the previous year, one in the Morell River, one in Cardigan River, one at the mouth of the Margaree River, and one at Friday's Cove, Strait of Belle Isle, Labrador, the last two approximately one hundred and five hundred miles distant across the Gulf of St. Lawrence.

Of the thirteen second-year fish (6 to $10\frac{1}{4}$ pounds, average 7·6 pounds) three were recaptured in the Morell (one at the mouth where it had previously been caught and released), one in St. Peter's Bay into which the Morell River flows, two off St. Peter's Harbour, one in the Midgell River which flows into St. Peter's Bay a short distance from the mouth of the Morell, and six in Newfoundland waters (East coast) approximately six hundred to nine hundred miles from where they were released.

Eleven of the twenty, 55 per cent, were recaptured in the vicinity of where they were released, one in Cardigan River, on the south side of the island, and eight, or 40 per cent, from one hundred to nine hundred miles distant.

Seven of the eleven recaptures reported from districts near where the salmon were tagged and released, namely the Morell and Midgell Rivers and St. Peter's Bay, were taken during September, October and November. Of the remaining four, three from St. Peter's Bay area and one from the Morell River were taken during August. They ranged in weight when tagged and after they were stripped from three and three-quarters to fifteen pounds and averaged eight and one-quarter pounds each. The Margaree recapture was a nine-pound fish and was taken in the net operated for fish cultural purposes at the mouth of that river. This net was operated that year from August 24 to October 1.

The seven recaptures (one first-year and six second-year) reported from Newfoundland and Labrador waters ranged in weight from six to ten and one-quarter pounds and averaged seven and one-half pounds each. All were recaptured as "early" fish during the month of June although they had been tagged and released as "late" fish. The Morell, like the Sackville and Philip, is definitely a "late" river but "late" fish tagged there contributed to the "early" salmon fishing at other places. The weights of the salmon when tagged and released does not seem to have had any bearing on the distance they travelled and salmon ranging from $3\frac{3}{4}$ to 15 pounds were recaptured in or near their home river, and those recaptured in Newfoundland and Labrador waters ranged from 6 to $10\frac{1}{4}$ pounds.

SUMMARY

1. The Atlantic salmon kelt of some Canadian rivers scatter widely in the sea; notably those of the Nictaux River, N.S., while those of other rivers, notably the Saint John River, N.B., resort to a limited area within a short distance of their "home" stream.

2. The weights of the salmon when released appear to have little influence on the distance they may go in the sea from their "home" stream as both large and small fish were recaptured nearby as well as at long distances from where they were tagged.

3. The recaptures show a definite movement of the Nictaux River, Port Maitland and Sackville River salmon in an easterly direction along the southerly shore of Nova Scotia towards Newfoundland and Labrador. A similar movement of River Philip, N.S., and Morell River, P.E.I. kelts toward Newfoundland is also indicated.

4. The kelt of some rivers, notably the Restigouche and River Philip, are predominantly second-year fish, a small proportion only being recaptured, particularly in their "home" stream, the year following that in which they were tagged and released.

5. A large proportion of the recaptures that were made at the greatest distances from their "home" stream were taken the first year and the majority of those recaptured in or near their "home" stream were taken during the second year following that in which they were tagged and released. All the Nictaux recaptures (19) from that stream and the Annapolis River into which the Nictaux flows were "early" second-year fish. Fifteen of the 18 recaptured at a distance including Newfoundland and Labrador waters were taken, mostly in November and December, during the first year following their release.

6. The recaptures show that the salmon that spawn late in the season in "late" rivers such as the Sackville, Philip and Morell contribute materially to the "early" salmon fisheries of other districts.

7. The early runs of the Miramichi River, N.B., are composed almost entirely of female salmon. Their eggs are consequently fertilized by late salmon or late grilse, indicating a common parentage, early and late as opposed to different races, of the salmon of that river.

8. A large percentage of the kelt that were caught, tagged and released as "late" fish were recaptured as "early" fish, further indicating a common parentage as opposed to different races. These percentages were 60 in the Miramichi River and 84 in the Margaree River.

SUMMARY OF TAGGING AND RECAPTURES OF ATLANTIC SALMON

1913-1942

	Tagged	Recap- tured	Percent- age recap- tured	Tagged		Recaptured		Year following tagging in which recapture was made			
				Early	Late	Early	Late	1st	2nd	3rd	4th
Tadoussac pond, Que.	641	6	0.93	6	0	6	0	1	5	0	0
York River, Que.	325	2	0.61	(c)	.....	1	1	0	2	0	0
New Mills pond, Restigouche River and tributaries, N.B.	2,134	28	1.31	(a) 17	2	(a) 18	1	3	25	0	0
Restigouche and Upsalquitch Rivers, N.B. (spring marking)	228	2	0.86	(b)	.....	7	1	.....	6	.....	.....
Nipisiguit River, N.B.	582	8	1.37	(c)	.....	(d) 24	16	2	35	2	3
Miramichi River, N.B.	2,721	48	1.76	62	(d) 40	60	(e)	28	32	2	0
Saint John River, N.B.	2,698	62	2.29	37	0	28	(f)	15	21	1	0
Nictaux River, N.S.	25	3	12.00	3	0	3	0	3	0	0	0
Port Maitland Traps, N.S.	239	1	0.41	1	0	1	0	1	0	0	0
Allen Lake, N.S.	637	27	4.23	0	27	12	15	15	11	0	1
Sackville River, N.S.	2,472	56	2.26	0	56	17	39	6	50	0	0
River Philip, N.S.	3,885	178	4.58	0	187	158	29	31	151	4	1
Margaree River, N.S.	(a) 455	9	1.97	0	.....	.....	.....	7	.....	.....	.....
Morell River, P.E.I.	750	20	2.66	0	20	12	8	7	13	0	0
	18,687	487	2.60	126	340	347	121	120	351	9	5

(a) 19, definite, see text.

(b) Spring kelt, indefinite, see text.

(c) Indefinite, see text.

(d) 40, definite, see text.

(e) Recaptured, one up-river from point of liberation and
one in Newfoundland waters.

(f) Recaptured in Newfoundland waters.

(g) Not stripped, see text.

* Operated since June 30, 1922, by the
Province of Quebec.

TRANSPORTATION

The Fish Cultural Service was again greatly indebted to the Canadian National, the Canadian Pacific, and the Dominion Atlantic railways for their generosity and assistance in providing free transportation for game fish and game fish eggs, and for officers travelling in charge of such shipments. This co-operation is indicated in the following summary:

Railway	Total mileage on trip passes	Number of passages	Mileage baggage car permits			Number of cases or cans			Number of permits
			Full	Empty	Total	Full	Empty	Total	
C.N.R.....	4,899	28	3,628	4,177	7,805	145	142	287	40
C.P.R.....	1,724	15	1,205	788	1,993	159	144	303	19
D.A.R.....	1,437	7	889	754	1,643	36	29	65	9
	8,060	50	5,722	5,719	11,441	340	315	655	68

NOTE.—Number of passages refers to transportation one way—a return trip counting as two passages. Number of permits refers to one way passages for cases or cans.

Disease preventive and curative methods practised, experiments undertaken, the marking of hatchery product, major repairs and improvements and operations generally at the several fish cultural establishments are referred to by the superintendents in their respective reports.

Owing to conditions brought about by the war and a limited appropriation, new construction was not undertaken and repairs and replacements were confined to essentials. Inspections of possible egg collecting waters and hatchery and rearing pond sites were also restricted.

Collections, transfers and distributions are given to the nearest hundred in the summaries of operations at the respective establishments.

MARITIME PROVINCES

Senior District Supervisor of Fish Culture, James Catt

A very satisfactory incubation of Atlantic salmon and speckled trout eggs collected in the fall of 1941 was completed early in the spring. The resultant fry and fingerlings made up the bulk of the season's distribution which also included a small number of rainbow trout from the Saint John hatchery stock. To this must be added the following yearlings and older fish: speckled trout 107,519, rainbow trout, 5,933, Atlantic salmon 69,834, and seabago salmon 36,665.

Losses and extreme drought caused some mortality amongst the young salmon and trout. However, the excellent size and quality of the stock distributed in the fall at least partially compensated for this.

In addition to hatchery distributions the capture and transfer of small mouthed black bass was carried out by Supervisors F. A. Tingley, A. P. Hills and the writer. The fish were obtained from Wheaton or Bocabec Lake, N.B., which was stocked from Spendie Lake on the international boundary in 1925. Some 122 bass were taken in the latter part of May and early June. Of these 107 were liberated into Bunker Lake, Yarmouth County, N.S. The first shipment of 52 was made by truck, patrol boat *Thresher* and truck June 12-13. The trip was completed in 17 hours 50 minutes with the loss of three fish. On June 17 the balance of 59 fish were transferred with the loss of one small specimen during the 12 hours in which the trip was completed.

A further collection of bass from Wheaton Lake was made in early September. Twenty-seven of these were liberated, 25 in good condition, 2 in fair

condition, in Big Meadow pond, Deer Island, N.B., without loss after a 5-hour trip by truck and patrol boat. The pond was also stocked with about 9,000 assorted cyprinids from Gibson Lake to provide forage for the bass.

The fish liberated in Bunker Lake varied from $\frac{1}{4}$ to $2\frac{1}{2}$ pounds in weight whilst those transferred to Big Meadow pond were of a rather larger average size—from $\frac{3}{4}$ to 2 pounds. During the two collections several fish estimated to be more than 4 pounds in weight were observed and specimens over 6 pounds in weight have been caught in the lake.

With the great increase in black bass from the original distribution made in Wheaton Lake, it was deemed advisable to augment the supply of forage fish. Accordingly $1\frac{1}{2}$ quarts of smelt eggs were obtained from Mill Lake, Charlotte County, N.B., and laid down green in a spring affluent to Wheaton Lake. Samples of these eggs hatched at Saint John showed a high percentage of fertility. This and later observations of the planting would indicate that the operation was successful.

A large collection of fall ova aggregating over 59,000,000 was obtained, approximately 23,000,000 from Atlantic salmon, 36,000,000 from speckled trout, 189,000 from landlocked salmon and 145,200 from rainbow trout.

The commercial fishermen and wholesalers of the Saint John area readily co-operated in obtaining and reporting the particulars desired in regard to marked Atlantic salmon that were taken or handled by them.

The public generally, however, throughout the Maritimes has again failed to supply information as to the capture of marked trout although a few individuals have shown their willingness to do so. Recaptures of marked landlocked salmon by the Department's officers at Chamcook Lakes indicate that 34 per cent of the mature fish resulted from hatchery plantings. Several landlocked salmon marked with red celluloid tags were reported spawning in the outlet to Gibson Lake. These fish were tagged by the staff of the Fisheries Research Board at St. Andrews in 1937 and liberated in upper Chamcook Lake. It is of interest to observe that 8 out of 49 large speckled trout liberated by the Research Board's staff near the outlet of lower Chamcook Lake had traversed it and were recaptured in the salmon trap placed in the run between the upper and lower lakes within forty-eight hours of their liberation.

The nutritional tests of the past year, in so far as they have gone, indicate that Cortland No. 353 diet with variations and additions will prove one of the most economical foods for fingerlings. Excellent results have also been obtained with combinations of plucks and "Fasterfat" fish meal (Lindloff) and liver and "Fasterfat" (Margaree). These diets may be used from the commencement of feeding. Small herring (sardines) are a satisfactory food for older fish. One group of speckled trout yearlings on this diet plus one feed of plucks and 25 per cent wheat germ per week averaged $\frac{3}{4}$ pound at Saint John. Females of the same group averaged 10.6 ounces.

Selective breeding was continued and a test to determine whether fingerlings resultant from small eggs attain the size of those hatched from larger eggs was carried out at Saint John hatchery. An equal number of small and large eggs were taken from each of several females. When laid down the small eggs were only 70.6 per cent of the size of the larger. When weighed on October 17 the fingerlings resultant from the small eggs were 89.2 per cent of those from the larger, indicating that the former made the more rapid growth and probably would shortly equal the latter in size.

Data obtained from survival tests carried out by Supervisor F. A. Tingley in Porter's and Mulgrave Lakes so far appear inadequate for the formation of any definite conclusion, but from those carried out on Halfway brook, Lunenburg County, definite if unlooked for information was obtained. Conditions in this stream appear to be outside the range tolerable to speckled trout. The pH varied

from 5.4 to 4.8, oxygen concentrations from 63.5 per cent to 62.8 per cent saturation at temperatures from 14.9° C. to 20.2° C. In spite of these adverse conditions the loss of fingerlings in the cage after 72 hours was only 1 fish out of 25 in 1941 and 1 out of 75 after 24 hours in 1942. In each of these cases the fish might have been lost owing to injuries in transfer.

In addition to the hatchery and pond inspections carried out by Supervisors F. A. Tingley and A. P. Hills the following waters not mentioned in their reports were examined by them: Spectacle Lake (Durling or Dalhousie Lake), Annapolis County, N.S., and Little Burpee brook, Sunbury County, N.B. In addition to these, Big Meadow pond, Deer Island, N.B., was investigated before the introduction to it of small mouthed black bass was effected. Seal Cove pond, Grand Manan, was examined with a view to the possible establishment of a gaspereau run to augment the bait supply of local fishermen.

The success obtained by planting rainbow trout in O'Keefe's Lake (Pisquid) and Glenfinnan Lake, P.E.I., is well known. Inquiries and observation show that there is now a large number of the above species in Sunken and Pugg Lakes, N.S., and Crooked creek and Little River, N.B. Three specimens taken in Pugg Lake were 5½, 6½ and 7 pounds respectively. Other large fish were observed. Resident anglers from Middleton and other towns in the district are well pleased with the sport provided by rainbow trout in Sunken Lake.

Brown, lochleven and hybrid trout (Atlantic salmon and brown trout) have spread throughout the Loch Lomond and Little River watersheds in Saint John and Kings Counties, N.B., and are established in Treadwell Lake, Saint John County. The latter has no outlet and their introduction was made many years ago.

In spite of heavy fishing Little River continues to carry brown, speckled and rainbow trout of all sizes from fingerlings to mature fish of several pounds weight.

Excellent catches of speckled trout have been made in McFadden Lake, Albert County, N.B., as a result of restocking it after the elimination of all its fish population three years ago. The increasing number of applications for stock from unbiased and observant anglers together with their statements is a clear indication that in their opinion the Department's stocking policy is meeting with success in very many cases.

Co-operation by the Administrative Branch of the Department was excellent. The care and assistance rendered by the Fisheries Supervisor, Southern New Brunswick (Bay of Fundy) and the Captain and crew of the patrol boat *Thresher* in transferring small mouthed black bass and speckled trout to Nova Scotia, Grand Manan and Deer Island is much appreciated.

With the necessary curtailment in Fish Cultural appropriations for the fiscal year together with the cost of unforeseen major repairs due to freshet damage, funds were not available for extensive new construction. However, the hatchery superintendents carried out such improvements as were possible and effected repairs to damage in a most efficient and commendable manner.

District Supervisor of Fish Culture, F. A. Tingley

In June and early July a canvass was made of the licensed fishermen of the Saint John watershed and Bay of Fundy shore to obtain reports of captured salmon that had been marked in the fingerling stage by fin clipping. Fin scars from 22 salmon were turned in during the season but these were in most instances for adipose fins only—the clipped side fins apparently having regenerated.

Five survival tests with speckled trout fingerlings were made in Porter's and Mulgrave Lakes and in Halfway brook. While the results of the lake tests have been conflicting and inconclusive, the stream tests in two consecutive years have shown practically one hundred per cent survival. In September, Supervisor Catt

was assisted in an examination of Back and Front Meadow brooks in Charlotte County to ascertain the feasibility of marking sufficient numbers of native trout to determine migratory movements. A collection of 33 small mouthed black bass was made at Wheaton Lake for stocking Big Meadow pond on Deer Island and 27 were transferred to the pond—25 in good condition and 2 only fair.

At Spear's brook the trout fences and trap were operated from September 24 to November 16 and forty-nine trout captured which yielded 53,450 eggs for Saint John hatchery. It is known that trout were lost from the pond this year through some agency other than escape and theft is suspected. In October and November assistance was given in the collection of landlocked salmon eggs at Chamcook Lakes. From 92 salmon 121,430 eggs were secured for incubation at Saint John hatchery.

Florenceville hatchery was visited in January in connection with the installation of the new superintendent. The Western Nova Scotia hatcheries were inspected twice. A number of lakes and one stream were examined and biological material gathered from different waters was examined and studied.

District Supervisor of Fish Culture, A. P. Hills

During the year the Grand Lake, Middleton, Florenceville, Grand Falls, Charlo, New Mills, Miramichi, Kelly's, Cardigan, Morell, Antigonish, Lindloff, Margaree, Cobequid, and River Philip establishments were inspected, eight of them twice. The spawning grounds at Clinch brook, tributary to Magaguadavic Lake were also examined. On the visit to Grand Lake the new Officer-in-Charge, Assistant W. H. Cameron, was installed. While in the vicinity of Cobequid hatchery a supply of plankton was collected and introduced into a hatchery pond that had previously been fertilized, with a view to establishing a culture of cladocerans, etc., for experimental feeding. The following waters were examined and reported on during the season—in New Brunswick, Wheaton Lake, Charlotte County and Kennebecassis River, Kings County; in Nova Scotia, Smelt Lake, Guysboro County, Lindloff and Shaw Lakes, Richmond County, Kilkenny Lake, Cape Breton County, Flat brook (near Margaree Harbour), Inverness County, and Trout or Moose Lake, Double or Twin Lake and Deyarmand or Island Lake, Colchester County.

The annual meeting of the New Brunswick Guides' Association was attended in Fredericton on March 31 and the meetings of the Fishery Officers and members of the Fish and Game Protective Associations at St. Stephen and Saint John on May 5 and 11 respectively. During May and June a collection of small mouthed black bass was made in Wheaton Lake, Charlotte County, and transferred to Bunker Lake in the Milo Lake system near Yarmouth, Nova Scotia. Later in the season some assistance was given in the capture of black bass and forage fish for introduction into Big Meadow pond on Deer Island. During the autumn assistance was also given in the installation of fences at Spear's brook and with the collection of trout eggs at that point and of landlocked salmon at Chamcook Lakes. Material collected in connection with examination of waters was examined and identified as time permitted.

ANTIGONISH HATCHERY

W. D. Turnbull, Superintendent

A collection of 21,445,100 speckled trout eggs was made from the fish in the hatchery ponds. This is over five million less than the record collection last year and is due to the fact that only 12,500 fish were stripped as against 16,900 last year. This collection was supplemented by receipt of 750,000 Atlantic salmon eggs from Margaree hatchery on April 1. Outgoing shipments of speckled

trout eggs in February and March were: to Lindloff 505,000, Saint John 1,005,000, Middleton 2,000,000, Kelly's 2,000,000, Grand Falls 2,000,000, Charlo 200,000, Miramichi 300,000, Cobequid 505,000, Florenceville 1,505,000, Bedford 1,000,000, and Yarmouth 3,000,000; and in November to Bedford 1,001,900, Middleton 1,500,000, and Yarmouth 1,001,600. In November 30,000 No. 5 speckled trout fingerlings were transferred to Grand Lake rearing station. Distributions for the year were: 725,600 Atlantic salmon and 3,988,400 speckled trout of which 6,511 trout one year and older were marked by removal of the adipose and right pectoral fins.

In selective breeding selected speckled trout females were paired with selected males and the eggs segregated to improve the brood stock. Selections were made on the basis of size of parents, colour, shape, yield of eggs, early spawning, freedom from disease and general appearance. Thirty-three pairs of selected two-year-old fish were mated and averaged 3,895 eggs per female with a top yield of 5,136 and a low of 3,272. Thirty-one pairs of selected three-year-old parents averaged 4,123 eggs per female with a top yield of 5,130 and a low of 3,600. In the general group the average yields per female were: 1 year old 869, 2 year 2,315 and 3 year 2,718. This three year group has shown a progressive increase in yield per female for the last four years—in 1939 it was 1,190, 1940, 1,971, 1941, 2,332, and in 1942, 2,718.

There was no serious outbreak of disease during the summer months notwithstanding a low water supply and high temperatures. The fry and fingerlings were kept in a healthy condition by weekly and bi-weekly dips in a solution of acetic acid, copper sulphate and salt. The severe drought which prevailed in Nova Scotia during the greater part of the summer caused a serious water shortage. Temporary relief of short duration was obtained by dredging South River from South River Lake to the hatchery. During the drought only seven of the nineteen long ponds could be used. For a considerable time the supply pipes were running only four-fifths full. The shortage of water was so serious at one time that all the three-year-old brood stock had to be transferred to an enclosed pool in the South River at the rear of the hatchery. While retained there a severe rain followed by flood swept away the enclosure but all the fish were recaptured by seining after the water had receded.

Special nutritional experiments were carried out under the direction of Miss Enid P. Knight, B.Sc., M.Sc., of the staff of Macdonald College. Grounds were improved and new timbers installed under the old supply pipe on concrete supports over the brook.

BEDFORD HATCHERY AND SACKVILLE RIVER SALMON-RETAINING POND

George Heatley, Superintendent

On March 18 a shipment of 1,000,000 speckled trout eyed eggs and in November 1,001,900 green eggs were received from Antigonish hatchery, also 57,000 Atlantic salmon, green eggs, from Sackville River pond and 1,623,600 from River Philip pond. Outgoing shipments between March and June consisted of 500,000 Atlantic salmon eyed eggs to Nictaux, 282,100 fingerlings of the same species to Grand Lake and 420,000 speckled trout fry and fingerlings to Coldbrook and on November 8 eight thousand Atlantic salmon eggs to Dalhousie University, Halifax. Some 81,800 Atlantic salmon were distributed direct from Bedford.

The experimental constant temperature egg hatching box with thermostatic temperature control, as mentioned in last year's report, was not as successful as was expected. The eggs in the box became coated with a very heavy gelatinous growth that killed all the trout eggs and caused serious losses in the salmon eggs. The hatch however was about a month earlier and the percentage losses in fry

and fingerlings in the temperature controlled group were less than in the general groups.

The unprecedented drought during the latter part of the summer caused the lowest water level yet experienced and left the hatchery and canal practically dry. The hatchery staff attended to the distribution from Grand Lake and assisted in transferring trout thereto from Antigonish. The hatchery truck was also loaned to Grand Lake in connection with repair work to the dam there. Repairs were made during the season to the Bedford dwelling, junction of the supply line, cribwork of the dam in the Sackville River and drainage system of the hatchery.

At the Sackville River pond this year between September 25 and October 22 twenty-nine Atlantic salmon were taken from which 11 females were stripped on November 7 yielding 57,000 eggs for Bedford hatchery. The average weight of the fish was 5 pounds as against 6 in 1941 and 5.4 in 1940. An unusual freshet swept away part of fences and flooded the entire river valley area, allowing migrating fish to pass upstream, except the last of the run which were taken after fences were repaired. Previous to this freshet the largest number of salmon for many years had been in evidence in Bedford Basin.

COBEQUID HATCHERY AND RIVER PHILIP SALMON-RETAINING POND

P. B. Stratton, Superintendent

In March, 505,000 speckled trout eyed eggs were received from Antigonish and in November, 3,783,700 Atlantic salmon green eggs from River Philip pond. Distributions for the season amounted to 734,500 speckled trout and 731,200 Atlantic salmon. Four thousand three hundred and forty-eight salmon and 3,095 trout were marked by the removal of the adipose and right ventral fins.

A severe freshet on September 23 which at one time caused the water to rise three or four feet over the dam washed away a width of approximately 60 feet on the right hand side of the dam and for 100 feet downstream. On the left side of the stream the bank was cut away about 12 feet. Some 87 feet of the main 18-inch diameter supply pipe was washed out which necessitated the immediate distribution of all fish in the hatchery ponds. The one- and two-year-old trout were distributed in the West Branch of the Wallace River and the balance of the stock transferred to the main outlet ditch from the ponds and moved down to Second River, River Philip, as the water receded.

An increased flow of water to the outside troughs was secured by replacing three 90° angles in the pipe line with two 45° elbows and running the pipe through the end of the head tank. A three-ton bin for salt was made within easy access to the retorts and the clay lining removed from two circular ponds and replaced with gravel. Improvements were made to the house and grounds, a 30-foot flag pole erected and 12 V-type pond shades built and stained.

At River Philip pond work was commenced on August 19 in repairing the dam and making alterations to the fishway and trap. The men's cabin and the spawning shed were rebuilt. Assistant C. Sayer reported for duty on October 5 and on the twenty-sixth Assistant I. A. Mowat arrived to take charge of stripping operations which commenced October 30 and terminated November 26. The catch from September 25 to November 7 amounted to 1,591 salmon of which 1,363 were retained and 228 liberated above the dam. From 830 females stripped 7,306,600 eggs were secured and allotted—762,400 to Yarmouth, 1,088,900 Middleton, 1,623,600 Bedford, 48,000 Doctor F. R. Hayes, Dalhousie University, and the balance 3,783,700 to Cobequid. The average weight of the salmon was 15.3 pounds. Two freshets occurred this season during which a fair number of fish passed over the dam.

Twenty of the salmon caught this season had been tagged and liberated at the River Philip pond two years previously.

COLDBROOK REARING PONDS

E. Barrett, Superintendent

The ponds were regravelled, disinfected and made ready for operations and between May 23 and June 6 some 420,000 speckled trout were received from Bedford hatchery. They produced 232,600 late summer and autumn fingerlings which were distributed with the aid of the Middleton staff and truck. Some of the young trout had attained a length of $5\frac{1}{4}$ inches. Valuable assistance was also given by the Fishery Inspector and members of the Kings County Fish and Game Association. Four outside rearing troughs 14 feet long, 15 inches wide and 10 inches deep and one supply trough were built and used below the dam for nutritional experiments.

GRAND LAKE REARING PONDS

*J. M. Butler, Superintendent**W. H. Cameron, Hatchery Assistant*

Superintendent J. M. Butler was transferred to Florenceville hatchery January 15 and Assistant W. H. Cameron from Antigonish hatchery took charge of Grand Lake on January 16.

Bedford hatchery in June supplied 282,100 Atlantic salmon fingerlings and Antigonish in November 30,000 speckled trout number five fingerlings. Conditions were most unfavourable for the collection of sebago salmon eggs. Two exceptionally severe freshets occurred during which Rawdon River overflowed its banks, the water for a time being four feet over the hatchery trap and fence, which were totally ineffective for at least eleven days when the spawning run was in the river. Repairs that were made at the hatchery dam also delayed the setting of the trap at Waverley Run until November 7 when the sebago run was practically over. Six thousand four hundred eggs were collected at these points and 61,000 from pond fish. A small percentage of the sebago eggs obtained from pond stock were hatched, and as was to be expected, the resultant fry grew much faster than the progeny of wild fish. This is the first time that a hatchery or domesticated strain of sebago salmon has been produced in Canada. Total distributions for the year were: speckled trout 39,700, sebago salmon 34,600 and Atlantic salmon 310,000 including 3,000 of the latter shipped to the Fisheries Research Board for Moser River. Twenty-four thousand three hundred and sixty-six sebago salmon were marked by the removal of their adipose and right ventral fins. Eighty-nine point five per cent of those taken at Rawdon River and Waverley run in the egg collection efforts were similarly marked showing that they were produced at the Grand Lake Ponds. In addition to extensive repairs to the dam and fishway a concrete flume from intake to the long ponds was built and the tool shed shingled.

KEJIMKUJIK REARING PONDS

T. K. Lydon, Officer-in-Charge

Two hundred and ninety-five thousand speckled trout advanced fry and fingerlings were received from the Middleton hatchery between May 14 and 17 and 300,000 Atlantic salmon advanced fry and fingerlings from Nictaux from May 20 to June 3. Considerable trouble was experienced with disease; gill disease affecting the salmon and white spot the trout. Losses were heavy despite curative treatments, leaving for distribution 41,000 trout and 146,000 salmon.

Four troughs for experimental feeding were built, part of the sheathing on the face of the dam replaced with new planking, a leak from the dam repaired and improvements made to the grounds and buildings. Good salmon fishing in the Medway River and exceptionally good trout fishing in Kejimikujik Lake and tributaries were reported.

LINDLOFF HATCHERY

Wm. T. Owens, Superintendent

Collections from the hatchery ponds and McRae Lake this year were larger than any previously made with 2,760,900 speckled trout eggs from the former and 198,400 from the latter collecting point. These were supplemented by 505,000 eggs of the same species from Antigonish on February 21 and 993,600 Atlantic salmon eggs from Margaree salmon pond on November 20. Distributions for the season were, 1,908,500 speckled trout and 839,800 Atlantic salmon, of which 13,436 yearling and three year old speckled trout were marked by the removal of the adipose and left pectoral fins. In selective breeding the eggs from 24 pairs of the best 2 year stock were segregated and the progeny will be further selected to effect improvement of the brood stock; also the eggs from 10 selected 2 year Margaree strain females were crossed with 3 year McRae Lake males, and eggs from McRae Lake females crossed with 2 year Margaree males.

Further grading was done on the new pond site and a new foundation was placed under the flume. Due to low water during the summer the brood stock had to be moved to temporary ponds in the hatchery brook. Fourteen additional troughs were installed outside and grounds improved by planting of flowers and shrubs. There was a continued improvement in angling conditions in the area supplied from this hatchery. Public interest was evident from reports of anglers on the recapture of marked fish and of reports received on general fishing conditions. Fishery officers when requested assisted in distributions in their respective districts.

MARGAREE HATCHERY

J. W. Heatley, Superintendent

The hatchery ponds produced 2,224,400 speckled trout eggs and 3,484,550 Atlantic salmon eggs were received from the Margaree pond between November 17 and December 4. Some 750,000 salmon eggs were shipped to Antigonish on March 31. Distributions for the year were 2,040,200 Atlantic salmon and 1,890,300 speckled trout of which 3,424 of the latter species, one to four years, were marked by the removal of the adipose and right pectoral fins.

In selective breeding, eggs from 27 pairs of 3 year old trout were taken and averaged 2,325 per female as against 1,562 per female in the general group. All brood stock older than the two year old group were distributed.

Losses were experienced due to enteritis and parasites but were not epidemic. Preventive treatments were carried out. A large proportion of the brood stock became infected with leeches but acetic acid proved effective in combating them. The outlets from the "S" and "A" series of rearing ponds were bridged and a truck road built along the sides of the ponds for about two-thirds of their length. A new fence was erected along the property on the north-eastern side of the brook. The grounds in front of the dwelling were improved and the barn, stable and garage repaired. Ten new hatching troughs were built replacing those beyond repair. A new telephone was installed in the dwelling.

Trout fishing in the Margaree and Lake O'Law districts was excellent. The Supervisor and his officers gave every co-operation.

MARGAREE SALMON-RETAINING POND

J. P. Chiasson, Superintendent

In accordance with the usual practice, the salmon for this pond were purchased from the Margaree Harbour Salmon Fisheries Association. Preparations began September 21 consisting of cleaning pond, repairing gates, caulking boat and repairing the towing pontoons. The Association's net was set September 28 and fished continuously until October 17 taking 730 salmon, of an average weight of 9.3 pounds—690 of these were retained and 40 liberated above the net. Only 8 salmon were lost during the retention period. From 462 females between November 16 and December 4, 4,478,200 eggs were obtained and allotted—3,484,550 to Margaree hatchery and 993,600 to Lindloff. During operations 4 tagged fish were taken and 2 with the adipose fin missing.

MERSEY RIVER REARING PONDS

C. E. Harding, Officer-in-Charge

Between May 25 and June 2 three hundred thousand Atlantic salmon advanced fry and fingerlings were supplied by Nictaux and on June 2 four thousand six hundred speckled trout fingerlings by Middleton hatchery. Distributions were made much earlier than usual this year as the Nova Scotia Power Commission found it necessary on June 27 to drain the pond supplying water to the Mersey ponds in order to effect repairs to their power station at No. 3 Development. Some 278,000 salmon were distributed June 25 and 26 and 4,195 trout on July 25, after the latter had been held ten days in a pontoon in the river and the balance of the time in troughs, the water by this time having been returned to the ponds.

With a great deal of assistance and the co-operation of the Nova Scotia Power Commission a foot bridge was built across the canal to the camp and ponds. Improvements were made to the camp, grounds and ponds. Assistance was rendered by the Fishery Inspector and wardens, the officials and staff of the Nova Scotia Power Commission and Queens County Fish and Game Association. A greater number of Atlantic salmon and grilse were reported in evidence in the Mersey River this season than for several years and parr and smolt in river and tributary brooks below No. 3 Development.

MIDDLETON HATCHERY, STEVENS PONDS AND NICTAUX REARING STATION

F. M. Millett, Superintendent

In February and March, 2,000,000 speckled trout eyed eggs were received from Antigonish hatchery; in November, 1,088,900 Atlantic salmon green eggs from River Philip pond and 1,500,000 speckled trout from Antigonish. Outgoing shipments were, 772,200 Atlantic salmon eyed eggs March 6 to Nictaux, 4,600 speckled trout fingerlings June 2 to Mersey and 295,000 fry and fingerlings of the same species May 14 and 17 to Kejimikujik rearing station. Distributions for the season were, 150,000 Atlantic salmon and 860,200 speckled trout.

Trout fishing in the district was reported very good this year. The Fish Forest and Game Associations continued to be very much interested in the distributions and the Fishery Inspectors whenever called upon were very willing to assist at all times.

The Nictaux rearing station was opened March 1 and on the sixth received 772,200 Atlantic salmon eggs from Middleton and on the sixteenth 500,000 eggs of the same species from Bedford. After an incubation and rearing period the

rearing station was cleared by shipments as follows: 300,000 Atlantic salmon advanced fry and fingerlings to Kejimikujik between May 20 and June 3; 300,000 of the same species to Mersey May 25 to June 2, and 386,000 Atlantic salmon fingerlings to Stevens ponds June 6.

YARMOUTH HATCHERY

F. F. Annis, Superintendent

The hatchery ponds produced 394,300 speckled trout eggs which collection was supplemented in March by 3,000,000 speckled trout eyed eggs from Antigonish and in October and November by 762,400 Atlantic salmon green eggs from River Philip pond and 1,001,600 speckled trout eggs from Antigonish hatchery. Distributions were 336,700 Atlantic salmon and 1,051,000 speckled trout, including 2,290 of the latter, one year old, marked by removal of the adipose and right ventral fins.

In selective breeding 5 pairs of 5-year-old trout yielded 1,947 eggs per female and 2 pairs of 3-year-old trout 2,300 eggs. The yield per female in the 3 year general group was 1,464. Some 8,457 No. 5 fingerlings from the local stock have also been selected and will be further graded from time to time.

There was not at any time a serious outbreak of disease among the trout fry or fingerlings, but fin rot which developed was successfully checked with formalin treatments. Fishery Inspectors showed their willingness to assist with fish cultural work when called upon. Two new supply troughs and six hatching troughs were constructed, the domestic water supply was reconnected with the well, and the sewage system repaired.

CHARLO HATCHERY

R. O. Barrett, Superintendent

The hatchery ponds this year produced their first crop of 296,800 speckled trout eggs. Two hundred thousand speckled trout eyed eggs were received in March from Antigonish and 2,127,300 Atlantic salmon green eggs in October and November from New Mills pond. Distributions for the year amounted to 1,298,200 Atlantic salmon and 25,100 speckled trout including 9,985 of the former and 3,000 of the latter species marked by the removal of the adipose and right pectoral fins.

In selective breeding 5 female and 3 male yearling speckled trout were stripped yielding 437 eggs per female as against 293 per female in the general group. Restigouche River and tributaries were reported as carrying many more salmon than during the record season of last year. The Restigouche Salmon Club is said to have taken about 3,000 salmon exclusive of grilse. Most of the other streams in the Charlo area also gave good fishing. The cement lined pond 65' x 25' was completed.

FLORENCEVILLE HATCHERY

T. K. Lydon, Hatchery Assistant

J. M. Butler, Superintendent

Assistant T. K. Lydon was in charge following the superannuation of the former superintendent and until the arrival of Superintendent J. M. Butler from Grand Lake rearing station on January 18.

The collection of speckled trout eggs from the hatchery ponds in October and November amounted to 2,101,500 being slightly higher than in either of the

last two years. Additional to this collection, the following eggs were received: in March and April 1,505,000 speckled trout from Antigonish, 600,000 Atlantic salmon from Miramichi and in November 918,400 Atlantic salmon from Miramichi pond. Distributions for the year were, 1,370,000 Atlantic salmon, 11,900 sebago salmon and 1,875,000 speckled trout, of which 11,870 sebago salmon and 12,376 speckled trout were marked by the removal of the adipose and one side fin.

In selective breeding eggs from 25 selected pairs were taken—6 trays from 2-year-old trout, 6 from 3-year-old, 6 from 5-year-old and 7 from 6- and 7-year-old fish.

The main hatchery received extensive repairs and the sub-hatchery was reinforced and improved, the driveways and walks were gravelled and grounds improved generally. Some very good reports on the angling in the district covered by this hatchery were received. Splendid assistance in making distributions was rendered by the Fredericton Fish and Game Association and by the local Fishery Inspector. The Atlantic Biological Station at St. Andrews was supplied with 655 one-year-old speckled trout May 6 for their Birch Cove ponds.

GRAND FALLS HATCHERY

W. A. McCluskey, Superintendent

In March and April, 2,000,000 speckled trout eyed eggs were received from Antigonish and 600,000 Atlantic salmon eggs from Miramichi, and in October and November, 1,456,600 from Miramichi salmon pond. Distributions for the season were, 1,570,800 speckled trout and 2,107,000 Atlantic salmon. The Grand Falls, Madawaska, and St. Leonard's branches of the New Brunswick Fish and Game Protective Association and all applicants for fry and fingerlings gave every assistance in distributing stock in a satisfactory manner.

MIRAMICHI HATCHERY AND SALMON-RETAINING POND

Frank Burgess, Superintendent

On March 7 three hundred thousand speckled trout eyed eggs were received from Antigonish and in October-November 5,201,700 Atlantic salmon green eggs from Miramichi pond. Outgoing shipments of Atlantic salmon eyed eggs in March and April were—50,000 to the United States Department of Interior, Fish and Wildlife Service for their station at East Orland, Maine, 800,000 to Saint John hatchery and 600,000 to each of Grand Falls and Florenceville hatcheries. Distributions for the season consisted of 3,451,700 Atlantic salmon and 267,500 speckled trout. It is reported that the commercial drift-net and set-net fishermen had a good season and that fly fishing was satisfactory in the district.

As usual the parent salmon for Miramichi pond were purchased by tender and contract, and from September 8 to 27 one thousand eight hundred averaging 9.06 pounds in weight were impounded. Between October 19 and November 9 nine hundred and forty-eight females were stripped yielding 7,576,700 eggs which were allotted as follows—5,201,700 to Miramichi, 1,456,600 to Grand Falls and 918,400 to Florenceville hatchery.

NEW MILLS SALMON-RETAINING POND

William White, Superintendent

Between May 21 and July 16 five hundred Atlantic salmon of the early run, purchased from 12 commercial fishing stands of the district, were delivered and impounded at New Mills pond. They averaged 16.5 pounds in weight and

at stripping time, October 22 to November 4, some 274 females yielded 2,127,300 eggs which were all laid down for incubation in the Charlo hatchery. Only 8 salmon were lost during the retention period from May to November.

Due to drought the brook supplying the pond went dry the latter part of July and no water flowed therein until October 20. The oil shed was moved to a new location a hundred yards west of the dwelling and a peak roof constructed. Nineteen new posts for the pond were supplied to replace old ones no longer safe.

SAINT JOHN HATCHERY

K. G. Shillington, Superintendent

A record collection of speckled trout eggs for this hatchery amounting to 6,641,700, being over twice the number taken last year, was made between October 21 and December 4 from the hatchery ponds; of this number 1,355,000 from yearling trout were planted direct in Spring brook and the balance laid down in the hatchery. The ponds also produced 145,200 rainbow trout eggs from April 14 to 24. The following eggs were received: in February 1,005,000 speckled trout from Antigonish; in April 800,000 Atlantic salmon from Miramichi; in October and November 121,400 sebago salmon from Chamcook Lakes, and 53,450 speckled trout from Spear's brook. Distributions for the season were—84,600 rainbow trout, 52,200 sebago salmon, 370,400 Atlantic salmon and 1,803,600 speckled trout, including 5,921 rainbow trout, 4,429 sebago salmon and 38,523 speckled trout fingerlings, yearlings and older fish marked by the removal of the adipose and one side fin.

In selective breeding the eggs from 26 pairs of selected two-year-old trout and 25 pairs of selected three-year-old were segregated. The average egg yield per female in the two-year selected stock was 2,779 as against 1,806 in the general group and in the three-year selected stock 3,216 as against 2,254 in the general group.

An egg picking device was made and was found to be about three times as fast and as efficient as the standard egg picker for eggs of poor quality, especially when there is not more than one tier to a tray. It consists of a quart sealer and two pieces of rubber tubing of unequal length, and works as a siphon in removing bad eggs. The 8-inch intake pipe leading from the reservoir to the longitudinal ponds was replaced by one 14 inches in diameter, but because of cold weather complete installation of this increased water supply with connections is being deferred until next spring.

All branches of the New Brunswick Fish and Game Protective Association within the Saint John distribution area gave assistance in their respective districts and in this regard special mention is made of the Moncton, Sussex, McAdam and Fredericton Junction branches for their co-operation. Much improved fishing is reported from McFadden, Dolan and Blackall Lakes.

Operations at Chamcook Lakes were carried on with the assistance of the District Supervisors of Fish Culture and under their general supervision.

Some 92 sebago salmon averaging 4 pounds in weight were caught between October 22 and November 24. One hundred and twenty-one thousand, four hundred eggs were obtained, November 6 to 27, from 57 females and transferred to Saint John hatchery. Thirty-four per cent of the sebgos handled had fins missing, having been marked and distributed from the Saint John hatchery. As the twine equipment previously used was no longer serviceable it was replaced by panel fences and traps which were equally, if not more efficient.

CARDIGAN REARING PONDS

C. A. Tait, Acting Superintendent

Preparations began in connection with the ponds on May 4 to have them in readiness for 800,000 speckled trout and 60,000 Atlantic salmon advanced fry which arrived May 11 to 14 from the Kelly's Pond hatchery at Southport. The output for the season was—555,700 trout and 42,400 salmon including 2,000 of the former marked by removal of the adipose and left pectoral fins. Every precaution was taken to keep losses at a minimum; overfeeding, particularly during rising or high temperatures, was carefully avoided; equipment and ponds were disinfected regularly; frequent preventive baths were given and pond populations were thinned and equalized as distributions were made. Good catches of rainbow trout were reported at O'Keefe's and Glenfinnan Lakes. Assistant C. Sayer, on loan from Cobequid hatchery, was in charge of the ponds this season.

KELLY'S POND HATCHERY AND MORELL RIVER SALMON-RETAINING POND

C. A. Tait, Superintendent

A collection of 50,100 speckled trout eggs was made from the hatchery pond this year and supplemented by 2,000,000 eggs of the same species March 1 from Antigonish and 1,418,300 Atlantic salmon from Morell salmon pond. Transfers of advanced fry in May to Cardigan rearing station consisted of 60,000 Atlantic salmon and 800,000 speckled trout. Distributions for the year were—510,300 Atlantic salmon and 702,100 speckled trout.

The strainers on the intake pipes were changed from a vertical to a horizontal position in the supply pond. They are now drawing from a lower level and the water as it comes into the hatchery is slightly cooler in summer and slightly warmer in winter than before. The hatchery office was renovated and a portion of the dwelling roof re-shingled.

At Morell salmon pond Assistant R. Macdonald was in charge. Between October 17 and November 19 some 312 salmon averaging 13.1 pounds in weight were caught and impounded. From 143 females, October 29 to November 24, 1,418,300 eggs were secured for Kelly's pond hatchery, and 62 fish not needed were liberated without being stripped. The camp was raised fifteen inches and re-roofed; the woodshed and wharf were rebuilt and a winch operated from the scow replaced the old capstan formerly used.

STATEMENT BY SPECIES, BY LOCAL COLLECTION AND DISPOSAL OF EGGS DURING 1942

Species	Collection area	Eggs collected	Number collected	Disposal— Establishment at	Eggs received	Number	Totals
Atlantic salmon	Margaree pond, N.S.	Nov. 16-Dec. 4.	4,478,193	Lindloff	Nov. 20	993,643	
				Margaree	Nov. 17-Dec. 4.	3,484,550	
	River Philip, N.S.	Oct. 30-Nov. 23.	7,306,580	Bedford	Nov. 6, 10	1,623,600	
				Cobequid	Nov. 12-24	3,783,700	
Rainbow trout.				Middleton	Nov. 3, 12	1,088,906	
				Yarmouth	Oct. 31	762,374	
	Sackville River, N.S.	Nov. 7	57,000	Dalhousie University, Halifax, N.S.	Nov. 11	48,000	
	Miramichi pond, N.B.	Oct. 19-Nov. 9.	7,576,672	Bedford	Nov. 7	57,000	
				Florenceville	Nov. 5	918,400	
				Grand Falls	Oct. 30-Nov. 3	1,456,560	
	New Mills pond, N.B.	Oct. 22-Nov. 4.	2,127,332	Charlo	Oct. 20-Nov. 9.	5,201,712	
	Morell River, P.E.I.	Oct. 29-Nov. 24.	1,418,300	Kelly's pond	Oct. 24-Nov. 5	2,127,332	
	Saint John hatchery ponds, N.B.	April 14, 24	145,200	Saint John	Oct. 29-Nov. 24.	1,418,300	22,964,077
	Grand Lake, N.S.	Nov. 9, 17	6,400	Grand Lake	April 14, 24	145,200	145,200
Speckled trout.	Grand Lake rearing ponds, N.S.	Nov. 5-Dec. 12	61,000	Grand Lake	Nov. 9, 17	6,400	
	Chamcook Lakes, N.B.	Nov. 6-27	121,430	Grand Lake	Nov. 5-Dec. 12	61,000	
	Antigonish hatchery ponds, N.S.	Oct. 31-Nov. 27.	20,059,074 (a) 1,386,000	Saint John	Nov. 6-27	121,430	188,830
				Antigonish	Oct. 31-Nov. 27.	17,941,554	
	Lindloff hatchery ponds, N.S.	Oct. 20-Dec. 2.	1,823,875	Bedford	Nov. 7	1,001,900	
	McRae Lake, Richmond County, N.S.	Oct. 5-17	198,376	Middleton	Nov. 9, 14	1,499,980	
	Margaree hatchery ponds, N.S.	Oct. 21-Nov. 18.	1,828,727	Yarmouth	Nov. 13	1,001,640	
	Yarmouth hatchery ponds, N.S.	Oct. 28-Nov. 30.	121,789				
	Charlo hatchery ponds, N.B.	Oct. 26-Dec. 26.	272,560	Yarmouth	Oct. 28-Nov. 30.	394,349	
	Florenceville hatchery ponds, N.B.	Oct. 12-Nov. 26.	156,965	Charlo	Oct. 26-Dec. 26.	296,791	
Seabago salmon.			(a) 139,826				
			(a) 2,050,510				
	Saint John hatchery ponds, N.B.	Oct. 21-Dec. 4.	50,955	Florenceville	Oct. 12-Nov. 26.	2,101,465	
			(a) 1,510,307				
(a) Eggs from yearling fish.	Spear's brook, Charlotte County, N.B.	Oct. 9-26	1,510,307	Saint John	Oct. 21-Dec. 4.	6,641,745	
	Southport (Kelly's pond) hatchery pond, P.E.I.	Nov. 14-Dec. 19.	53,450	Saint John	Oct. 9-26	53,450	
			50,100	Kelly's pond	Nov. 14-Dec. 19.	50,100	36,166,631
							59,464,738

(a) Eggs from yearling fish.

The United States Department of the Interior, Fish and Wildlife Service, Washington, D.C., was sent 50,000 Atlantic salmon eyed eggs on March 2 for their Craig Brook Fisheries Station at East Orland, Maine.

In the interest of economy and convenience in distribution the following transfers were made in 1942:—

Species	Stage	From	To	Number	Date received
Atlantic salmon..	(e)	Bedford.....	Grand Lake.....	282,092	June 24-27
	(c)	Bedford.....	Nictaux.....	500,000	March 16
	(c)	Margaree.....	Antigonish.....	750,000	April 1
	(c)	Middleton.....	Nictaux.....	772,160	March 6
	(c)	Nictaux.....	Middleton.....	386,000	June 6
	(d)	Nictaux.....	Kejimkujik.....	260,000	May 20-24
	(e)	Nictaux.....	Kejimkujik.....	40,000	June 3
	(d)	Nictaux.....	Mersey.....	200,000	May 25-30
	(e)	Nictaux.....	Mersey.....	100,000	May 31-June 2
	(c)	Miramichi.....	Florenceville.....	600,000	April 4
	(c)	Miramichi.....	Grand Falls.....	600,000	April 4
	(c)	Miramichi.....	Saint John.....	800,000	April 3
	(d)	Kelly's Pond.....	Cardigan.....	60,000	May 14
	(c)	Antigonish.....	Bedford.....	1,000,000	March 18
	(c)	Antigonish.....	Cobequid.....	505,000	March 6
Speckled trout...	(c)	Antigonish.....	Lindloff.....	505,000	February 21
	(c)	Antigonish.....	Middleton.....	2,000,000	Feb. 25, March 21
	(c)	Antigonish.....	Yarmouth.....	3,000,000	March 19, 26
	(c)	Antigonish.....	Charlo.....	200,000	March 7
	(c)	Antigonish.....	Florenceville.....	1,505,000	March 13
	(c)	Antigonish.....	Grand Falls.....	2,000,000	March 6
	(c)	Antigonish.....	Miramichi.....	300,000	March 7
	(c)	Antigonish.....	Saint John.....	1,005,000	February 25
	(c)	Antigonish.....	Kelly's Pond.....	2,000,000	March 1
	(e)	Antigonish.....	Grand Lake.....	30,000	November 13-20
	(d)	Bedford.....	Coldbrook.....	200,000	May 23, 27
	(e)	Bedford.....	Coldbrook.....	220,000	May 25, 26, June 6
	(e)	Middleton.....	Mersey.....	4,600	June 2
	(d)	Middleton.....	Kejimkujik.....	220,000	May 14-16
	(e)	Middleton.....	Kejimkujik.....	75,000	May 17
	(d)	Kelly's Pond.....	Cardigan.....	800,000	May 11-13

(c) eyed eggs.

(d) fry.

(e) fingerlings.

DEPARTMENT OF FISHERIES

NUMBERS ON HAND OF EGGS, FRY, FINGERLINGS AND OLDER FISH AT THE END OF CALENDAR YEAR 1942

Establishment	Species	Eggs	Fry	Fingerlings	1 year	2 years	3 years	4 years	5 years and older	Total by species	Total by hatchery
Antigonish.....	Atlantic salmon.....	16,318,479		100						100	
Bedford.....	Speckled trout.....	1,458,022		16,000	10,020	8,270				16,352,769	16,352,869
	Atlantic salmon.....	775,370								1,458,022	2,233,892
Cobequid.....	Speckled trout.....	3,592,407								775,870	3,592,407
Grand Lake.....	Atlantic salmon.....	38,565		4,684	1,000	200	206		65	44,720	74,720
	Speckled trout.....			30,000						30,000	
Lindlof.....	Atlantic salmon.....	984,343		100						984,443	
	Speckled trout.....	2,423,328	141,720		1,451	889				2,567,388	3,551,831
Margaree.....	Atlantic salmon.....	3,440,000		100						3,440,100	
	Speckled trout.....	1,712,998		9,050	6,755	1,637				1,730,440	5,170,540
Middleton.....	Atlantic salmon.....	915,350								915,350	
	Speckled trout.....	1,058,240		100						1,058,240	1,973,590
Yarmouth.....	Atlantic salmon.....	488,699								488,823	
	Speckled trout.....	1,278,506		19,357	1,376	324	45	24	16	1,299,624	1,788,447
Charlo.....	Atlantic salmon.....	2,013,652		384	1,000	1,000				2,014,036	
	Speckled trout.....	242,184								244,184	2,258,220
Florenceville.....	Atlantic salmon.....	873,664		30,765						904,429	
	Speckled trout.....			14,124		105				14,229	
	Sebago salmon.....	1,974,466								1,986,212	2,904,870
Grand Falls.....	Atlantic salmon.....	1,415,510		1,573	2,777	2,955	1,884	789	1,768	1,415,510	1,415,510
Miramichi.....	Atlantic salmon.....	5,049,885								5,049,885	
	Speckled trout.....			418						418	5,050,303
Saint John.....	Atlantic salmon.....									64	
	Rainbow trout.....				1,179	64			20	1,199	
	Sebago salmon.....	120,620		8,072	1,588					130,280	
	Speckled trout.....	4,670,963		6,641	13,771	602				4,691,977	4,823,520
Kelly's Pond.....	Atlantic salmon.....	1,396,040								1,396,040	
	Speckled trout.....	49,315								49,315	1,445,355
			141,720	141,084	41,301	16,046	2,135	813	1,869	52,636,074	52,636,074

DISTRIBUTIONS

KEY TO ABBREVIATIONS

<i>Species</i>	<i>Stage of Development</i>
A Atlantic salmon	a Green eggs
S Speckled trout	b Eyed eggs
R Rainbow trout	c Fry
L Landlocked or Sebago salmon	d Advanced fry
	1 No. 1 fingerlings
	2 No. 2 fingerlings
	3 No. 3 fingerlings
	4 No. 4 fingerlings
	5 No. 5 fingerlings
	f Yearlings
	g Two years
	h Three years
	k Older fish

CLASSIFICATION

Advanced fry: Fry that are feeding systematically.

Fingerlings:

- No. 1. Feeding from two to eight weeks.
- No. 2. Feeding from eight to fourteen weeks.
- No. 3. Feeding from fourteen to twenty weeks.
- No. 4. Feeding from twenty to twenty-six weeks.
- No. 5. Feeding from twenty-six weeks to one year from date of hatch.

NOVA SCOTIA

ANTIGONISH HATCHERY

Antigonish County—

Afton River—50,000 Sd.
 Beaver Meadow River—60,000 S1, 10,000 S2,
 5,000 S4.
 Big brook—South River—40,000 S1, 2,500
 S4, 67 Sf.
 Black River—30,000 Sd, 40,000 S1.
 Brierly brook—40,000 Sd.
 Copper Lake—60,000 S1, 600 Sh.
 Delhanty Lake—50,000 Sd.
 Gaspereaux Lake—600 Sh.
 Glenroy River—25,000 Sd, 40,000 S1, 2,500 S4.
 James River—40,000 A1.
 Maryvale or Malignant brook—20,000 Sd.
 Meadow Green River—35,000 Sd, 40,000 S1,
 2,500 S4.
 Middleton Lake—40,000 S1, 10,000 S2.
 Middleton brook—10,000 S1.
 North Lake brook—60,000 Sd.
 North River—30,000 S1.
 Pinevale brook—35,000 S1.
 Pinevale Lake—894 Sh.
 Polson brook—South River—40,000 Sd,
 10,000 S1, 1,500 S4.
 Rights River—40,000 A1.
 South River—45,000 A1, 1,600 A4.
 South River Lake—60,000 Sd, 50,000 S1,
 10,000 S2, 2,000 S4, 600 Sh.
 South brook—40,000 Sd.
 Springfield brook—Glenroy River—25,000 Sd.
 West River—60,000 Sd, 61,000 S1, 10,000 S2,
 5,000 S4.

Cumberland County—

Snare Lake—3,000 S3.

Guysborough County—

Canter Lake—40,000 S1, 10,000 S2.
 Cole Harbour Lake, lower—90,000 S1.
 Cocee Coffre Lake—60,000 S1, 20,000 S2.
 Country Harbour River—50,000 A1.
 Cudahys Lake—50,000 S1, 4,000 S2.
 Dobson Lake—90,000 S1, 750 Sf.
 Donahue Lake—100,000 S1, 20,000 S2, 750 Sf.
 Doyle Lake—40,000 S1, 6,000 S2.
 Ecumsecum River—130,000 S1.
 Eight Island Lake—60,000 S1.
 Fitzgerald Lake—45,000 S1, 5,000 S2.
 Giant Lake—108,000 S1, 1,885 S4.
 Glencove Lake—15,000 S2.
 Goldboro or Goldbrook Lake—45,000 S1.
 Guysborough River—60,000 S1.
 Hydro dam, Havre Bouche River—80,000 S1,
 10,000 S2.
 Hazel Hill Lake—105,000 S1.
 Indian Harbour Lake—80,000 S1.
 Jellow Lake—80,000 S1, 10,000 S2, 750 Sf.
 Kennedy Lake—50,000 S1.
 Long Lake—Salmon River—25,000 S2.
 MacDonald Lake—Guysborough River—
 30,000 S2.
 Mannassette Lake—15,000 S2.
 McInnis (Joe's) Lake—69,000 Sd, 1,500 S4.
 McKeen Lake—30,000 S1.

NOVA SCOTIA—*Concluded*

McPherson Lake (Port Shoreham)—60,000 S1.	Brora Lake—30,000 S2, 10,000 S4.
Morrison Lake—40,000 S1.	Cummings dam, Brown brook—30,000 S2.
Narrow Lake—60,000 S1.	Calder Lake—15,000 S2.
Nickerson Lake—40,000 S1.	Campbell Lake—French River—15,000 S2.
Porter River—35,000 S1.	East River—50,000 A1, 70,000 S1, 2,500 S4, 400 Sf.
East River St. Mary—115,000 A1, 66,500 A2.	East River pond, above dam—10,000 S3.
West River St. Mary—115,000 A1, 42,500 A2.	East River, West branch—30,000 S1, 5,000 S4.
Salmon River—40,000 A1, 50,000 S1, 5,000 S2.	Blue Mountain dam, French River—10,000 S2.
Seal Harbour Lake—45,000 S1.	French River—20,000 A1.
Sherbrook Lake—90,000 S1, 750 Sf.	French River branch (French River Settlement)—60,000 Sd.
Square Lake—Salmon River—25,000 S2.	Lansdowne Lake—15,000 S3.
Sullivan Lake—50,000 S1, 1,500 S4.	McLellan brook—50,000 Sd, 5,000 S3.
Three Mile Lake—15,000 S2.	McLellan Lake—15,000 S2.
Tracadie River—30,000 A1.	McPherson Lake, 20,000 S3.
Two Mile Lake—East River St. Mary—20,000 S2.	Middle River—30,000 A1, 10,000 S4.

Pictou County—

Barney River—40,000 A1.
Barney River, above dam—60,000 Sd.
Big brook, below dam—East River—50,000 S1, 2,500 S4.
Big brook, above dam—East River—350 Sf.

Sutherland River—50,000 Sd.
West River—120,000 S1.

BEDFORD HATCHERY

Lunenburg County—

Gold River—42,148 A2.

Middle River—39,616 A2.

COBEQUID HATCHERY

Albert County—

Pollett River—19,500 A2.

Colchester County—

Chiganois River—30,000 Sd.
Debert River—20,000 A2, 30,000 Sd.
Economy Lake—10,000 Sd.
Economy River—15,000 A2.
Folly River—15,000 A1.
Folly Lake—25,000 Sd, 920 Sh.
French River—30,000 Sd.
Gamble Lake—10,000 Sd.
Little Gamble Lake—5,000 Sd.
Great Village River—20,000 A2.
Hart Lake—16,000 Sd.
Newton Lake—10,000 Sd.
North River, near Truro—20,000 A2.
Portapique River—15,000 A1.
Salmon River—45,000 A2.
Silica Lake or Bass River Lake—12,000 S1.
Simpson Lake—271 Sh, 648 Sk.
Waughts River—20,000 Sd.

Moose creek—32,000 Sd.
Mountain brook—15,000 Sd.
Newfound Lake—20,000 Sd.
River Philip—45,000 A1, 85,000 A2.
River Philip, west branch—10,000 A1, 15,000 S1.
River Philip, east branch—5,000 A1, 285,338 A3, 6Ak, 15,000 S1, 164 S3, 2,795 Sh, 2,774 Sk.
Polly brook—10,000 Sd.
Pugwash River—12,500 Sd.
Ramshead River—30,000 Sd.
Ramshead Lake—10,000 Sd.
Shinimikas River—15,000 A2.
Smith's pond (Amherst)—2,500 Sd.
Sutherland Lake—16,000 Sd, 705 Sh, 195 Sk.
Tidnish River—15,000 A2.
Tillies brook—15,000 Sd.
Wallace River—26,400 A1, 35,000 A2, 30,000 Sd, 15,000 S1.
Wallace River, west branch—25,000 Sd, 359 Sf, 794 Sg.
Webb Lake—5,000 S1.

Cumberland County—

Barbour Lake—5,000 Sd, 356 Sg.
Biswanger brook—River Philip—12,500 Sd.
Black River—30,000 Sd.
Brownell brook—Shinimikas River—10,000 S1.
Coulter Lake, upper—5,000 Sd.
Fountain Lake—12,000 S1.
Gilbert Lake—12,000 S1.
Isaac Lake—15,000 Sd.
Little Lake—Newfound Lake—5,000 S1.
Maccan River—15,000 A1, 30,000 S1.
McAloney Lake—12,000 S1.

Westmorland County—

Carter's brook—Westcock creek—10,000 Sd.
Fawcett brook—Silver lake or Morice pond—10,000 Sd.
Gaspereau River—25,000 A2, 18,000 Sd.
Jenks brook—Tantramar River—20,000 Sd.
Mates brook (Shemogue)—6,000 Sd.
Meadow brook—Gaspereau River—6,000 Sd.
Mill brook—C.N.R. Reservoir—10,000 Sd.
North brook—Musquash Lake—10,000 Sd.
Reservoir brook—Carter's brook—10,000 Sd.
Little Shemogue River—10,000 Sd.

COLDBROOK PONDS

Kings County—

Annapolis River—17,500 S4.
 Aylesford Lake—27,000 S4.
 Burke Lake—10,000 S4.
 Canard River—10,000 S4.
 Cornwallis River—30,000 S4.
 Crooked Lake—5,000 S4.
 Gaspereau Lake—22,000 S4.
 Lake George—25,000 S4.

Habitant River—5,000 S3.
 Mack Lake—5,000 S3.
 Murphy Lake—22,000 S4.
 Lake Paul—5,000 S3, 14,000 S4.
 Torment Lake—9,500 S3, 10,000 S4.
 Trout River—5,000 S4.
 Turbett Lake—5,000 S3, 5,000 S4.

Lunenburg County—

Halfway brook—643 S2.

GRAND LAKE PONDS

Colchester County—

Graham Lake—1,000 Sf.
 Stewiacke River—20,000 A2, 5,000 Af.

Halifax County—

Beaver Lake—Musquodoboit River—700 Sf.
 Chezzetcook River—10,000 A2, 3,000 Af.
 Eagle Lake—Partridge run—2,000 Sf.
 Five Island Lake—3,500 Sf.
 Grand (Shubenacadie) Lake—80 Af, 14,273 L3, 14,555 Lf, 5,377 Lg, 324 Lh, 110 Lk, 143 Sf.
 Hatchet Lake—2,500 Sf.
 Henry Lake—1,000 Sf.
 Ingram River—10,000 A2, 4,000 Af.
 Long Lake—Little Salmon River—1,000 Sf.
 Moody Lake—2,500 Sf.
 Moser River—3,000 A2.
 Musquodoboit River—20,000 A2, 5,000 Af.
 Nine mile River—10,000 A2, 4,000 Af.
 Pace Lake—1,500 Sf.
 Upper Petpeswick, Long Bridge or Bridge End Lake—4,000 Sf.
 Rawdon River—20,000 A2, 5,008 Af.
 Russell Lake—2,000 Sf.
 Sackville River—20,000 A2, 5,000 Af.
 Salmon River—Echo Lake—20,000 A2.

Little Salmon River—Cole Harbour—10,000 A2.
 Salmon River (Port Dufferin)—20,000 A2, 4,000 Af.
 Sheet Harbour Flowage—East River—2,000 Sf.
 Sheldrake Lake—1,000 Sf.
 Ship Harbour River—20,000 A2, 5,000 Af.
 Spider Lake—1,000 Sf.
 Springfield Lake—2,500 Sf.
 Tangier River—5,240 Af.
 Webster Lake—1,000 Sf.
 West River Sheet Harbour—20,000 A2, 5,000 Af.
 William or First Lake—2,392 Sf.

Hants County—

Cameron Lake—1,500 Sf.
 Kennetcook River—20,000 A2.

Lunenburg County—

East River—17,200 A3, 4,000 Af.
 Gold River—10,500 Af.
 Hennigar or Stanford Lake—2,500 Sf.
 Middle River—5,000 Af.
 Spondo Lake—4,000 Sf.

KEJIMKUJIK PONDS

Kejimikujik Lake—11,000 S4.

Fairy Lake—1,000 S4.
 Little River—5,000 S4.
 Maitland River—5,000 S4.
 Mount Tom brook—4,000 S4.
 Rodger brook—1,000 S4.
 Snake Lake—4,000 S4.
 Westward or West River—5,000 S4.

Lahave River—20,000 A4.
 Medway River and tributaries—100,000 A1, 26,000 A4.
 Freeman Lake—500 S4.
 Harmony Lake—1,500 S4.
 Mill pond, near Caledonia—1,000 S4.
 Tupper Long Lake—2,000 S4.

LINDLOFF HATCHERY

Cape Breton County—

Canoe Lake—35,000 S1.
 Catalogne Lake—61,409 S2, 2,008 Sf.
 Chain or String Lakes—Mira River—35,000 S1.
 Cochran Lake—1,896 Sf.
 Dutch Brook Lake—35,000 S1.
 Gaspereaux River—40,000 A1, 35,000 A2.
 Gillies Lake—East Bay—3,868 Sf.
 Grand Lake, near Louisburg—40,000 S2.
 Hardy Lake—35,000 S1.
 Kelvin Lake—50,000 S1.
 Kilkenny Lake—1,715 Sf.

Loon Lake—Mira Bay—1,896 Sf.
 McCormick Lake—20,000 S1.
 Meadow brook—Sydney River—60,000 S1.
 Otter Lake—7,000 S1.
 Salmon River—40,000 A1, 187,000 A2.
 Stewart Lake—50,000 S2.

Inverness County—

Brawley Lake—25,000 S2.
 Horton Lake—30,000 S2.
 McIntyre Lake—Port Richmond—35,000 S1.
 Pleasant Hill Lake—30,000 S2.

LINDLOFF HATCHERY—*Concluded**Richmond County—*

Lake Abova—25,000 S1.
 Black River—100,000 S1.
 Breen Lake—40,000 S1.
 Buchanan Lake—40,000 S1.
 Chain Lakes (Madame Island)—30,000 S1,
 12,000 S2.
 Ferguson Lake—76,281 S1.
 Ferguson brook—20,000 S1.
 Forest Lake (Madame Island)—58,000 S2,
 2,000 Sf.
 Framboise River—110,000 A2.
 Grand Lake (Madame Island)—90,000 S1,
 30,000 S2.
 Grand River—50,000 A1, 37,000 A2, 1,817 A3.
 Indian Lake—40,000 S2.
 Kytes Lake—25,742 S2, 53 Sh.
 Lindloff or Hatchery brook—9,661 S4.

Loch Lomond—130,000 A1, 209,000 A2.
 MacLeod brook—25,000 S1.
 Mary Ann's Lake—20,000 S1.
 McIsaac Lake—50,000 S1.
 McKenzie Lake—60,000 S2.
 McNab Lake—50,000 S1.
 Mill Lake—East River Tillard—60,000 S2.
 Potties Lake (Madame Island)—30,000 S1,
 10,000 S2.
 Saint Esprit Lake—50,000 S1.
 Scott brook—100,000 Sd.
 Seaview Lake—50,000 S1.
 Shaw Lake (Madame Island)—50,000 S2.
 Straughton brook—25,000 S1.
 Thompson Lake—20,000 S1.
 River Tillard, East—40,000 Sd.
 River Tillard, West—60,000 Sd.
 River Tom—50,000 S1.

MARGAREE HATCHERY

Cape Breton County—

Belle Lake—10,000 S4.
 Black brook—Mira River—10,000 S2.
 Browns Lake—Indian Bay—10,000 S3.
 Ferguson Lake—(New Boston)—5,000 S4.
 Forester Lake—10,000 S3.
 Giovonetti Lake—10,000 S2.
 Grand Lake—Indian Bay—10,000 S5, 1,200
 Sf.
 Jackson or Johnson Lake—8,000 S5, 1,000 Sf.
 Keefe Lake—10,000 S3.
 McDonald or Widow Lake (New Boston)—
 10,000 S4.
 McInnes Lake—10,000 S5.
 McIntyre Lake (New Boston)—10,000 S3.
 McMillan Lake—10,000 S4.
 McPherson Lake (New Boston)—10,000 S3.
 Scotch or Scott River—10,000 S4.
 Trout brook—Mira River—10,000 S2.

Inverness County—

Big brook—River Denys—50,000 S1.
 Captain John's brook—10,000 S1.
 Cheticamp River—50,000 Ad, 200,000 A1.
 Farm brook—20,000 S1.
 Galant River—55,000 S1.
 Galant River, mouth of—35,000 A3.
 Gillis brook—20,000 S1.
 Glen brook—River Denys—20,000 S1.
 Glenora brook—10,000 S1.
 Graham brook—30,000 A1.
 Grand Etang brook—20,000 S3.
 Judique River—10,000 S1.
 Mabou River, northeast—50,000 S1.
 Mabou River, southwest—50,000 S1.
 Margaree River, northeast and tributaries—
 150,000 Ad, 220,000 A1, 120,000 A2,
 214,800 A3, 395 A4.
 Big brook—55,000 S1, 320 Sh.
 Egypt brook—50,000 S1, 157 Sh.
 Forest Glen brook—55,000 S1.
 Ingraham or Ingram brook—20,000 S1, 238
 Sf.
 Levis brook—45,000 S1.
 McDonald brook—20,000 S1.
 McLeod brook—20,000 S1.

Murray brook—10,000 S1.
 Lake O'Law brook—50,000 S1, 6,300 S5, 300
 Sh.
 Lake O'Law—25,000 S4, 5,400 S5.
 Fortune brook—20,000 S1.
 McKinnon brook—30,000 S1.
 Murphy brook—35,000 S1.
 Lake O'Law, upper—20,000 S2.
 Watson brook—30,000 S1.
 Margaree River, southwest—100,000 Ad,
 280,000 A1, 20,000 A2.
 Captain Allan's brook—50,000 S1.
 Matheson Glen brook—40,000 S1.
 McDonnell brook—30,000 S1.
 McLellan ponds—8,000 S1.
 McColl brook—20,000 S1.
 McPherson brook—River Denys—30,000 S1.
 Mull River—60,000 A1.
 Pembroke Lake—15,000 S2.
 Plaster ponds—100 Sg, 37 Sh, 72 Sk.
 Plateau brook—60,000 S1.
 Skye brook—30,000 S2.
 Strathlorne brook—45,000 S1, 2,148 Sf.

Victoria County—

Aspy River, north—40,000 A1.
 Aspy River, middle—40,000 A1.
 Baddeck Bay brook—30,000 S1.
 Baddeck River—50,000 Ad, 50,000 A1.
 Farquar Angus or McDonald brook—
 40,000 S1.
 Gillis brook—55,000 S1.
 Peter brook—40,000 S1.
 Barasois brook—50,000 S1.
 Big Harbour brook—10,000 S1.
 Campbell brook (Estmere)—10,000 S4.
 Carey Lake—5,000 S4.
 Dalem Lake (Boularderie Island)—20,000 S2.
 Giffin Lake—7,500 S3.
 Ingonish River—30,000 A1.
 McKinnon Harbour brook—10,000 S1.
 McLean brook (Ottawa Brook)—7,500 S4.
 McNeil brook (Gillie Point)—10,000 S1.
 McPhie brook (Southside Boulardarie)—
 10,000 S2.
 Middle River—50,000 Ad, 50,000 A1.

MARGAREE HATCHERY—*Concluded*

Beaver brook—35,000 S1.
 Black brook—34,000 S2.
 Cold brook—20,000 S1.
 Indian brook—71,500 S1.
 McDonald brook—40,000 S1.

Morrison Lake—7,500 S3.
 North River—50,000 Ad, 200,000 A1.
 Church brook—20,000 S1.
 Tarbot Lake—9,000 S2.
 Washabuck River—50,000 S1.

MERSEY RIVER PONDS

Mersey River and tributaries—278,000 A1.
 Upper Great brook—4,195 S2.

MIDDLETON HATCHERY

Annapolis County—

Annapolis River—25,000 A3.
 Barnes Lake—10,000 S2.
 Boot Lake—10,000 S3.
 Crisp brook—15,000 Sc.
 Durling Lake—4,000 S3.
 Elliott Lake—15,000 S1.
 Fed Lake—8,000 S1.
 Fishers Lake—12,000 S2.
 Gibson Lake—10,000 S2.
 Lake Jolly—15,000 S2.
 Lake La Rose—15,000 S1.
 Little River—Annapolis River—15,000 Sd.
 Long Lake—Medway River—10,000 S2.
 McGill Lake—15,000 S2.
 Medcraft Lake—8,000 S3.
 Mink brook—10,000 S1.
 Morton brook—5,000 S2, 500 S3.
 Mulgrave Lake—800 S2, 800 S3.
 Nictaux River—125,000 A3, 10,000 S4.
 Paradise Lake—20,000 S1.
 Lake Pleasant—20,000 S1.
 Rumsey Lake—13,000 S3.
 Sand Lake—5,500 S3.
 Sandy Bottom Lake—10,000 S2.
 Scrag Lake—4,000 S3.
 Shannon River—25,000 Sc, 10,000 S3.
 Slocomb brook—8,000 S1, 2,000 S3.
 Spectacle Lake—Alma Lake—6,000 Sd.
 Thirty Lake—20,000 S1.
 Lake Tommy—10,000 S1.
 Trout Lake—20,000 S2, 8,000 S3.
 Walker brook—10,000 S1, 2,000 S3.
 Waterloo Lake—25,000 Sc.
 Wiswell brook—6,000 S1, 1,000 S3.
 Wrights Lake—10,000 S1.
 Zwicker Lake—20,000 S2.

Digby County—

Haines Lake—5,000 S3.
 Mallette Lake—5,000 S3.
 Porter or Mistake Lake—800 S2, 6,800 S3.
 Round Lake—2,000 S3.

Hants County—

Cameron Lake—10,000 S2.
 Falls Lake—4,000 S2.
 Falls Lake stillwater—10,000 S3.
 Halfway River—3,000 S3.
 Lakeland Lake—20,000 S1.
 Lebreau brook—5,000 S2.
 Maple brook—2,000 S3.
 Mockingigh Lake—18,000 S2.
 Murphy Lake—10,000 S1.
 Nix Lake—8,000 S2.
 Palmer Lake—8,000 S3.
 Panuke Lake—10,000 S3, 5,000 S4.
 Lake Pleasant—8,000 S3.
 Smiths Lake—2,000 S2.
 Zwicker or Daniel Lake—15,000 S1.

Lunenburg County—

Butler Lake—10,000 S2.
 Canoe Lake, north—10,000 S3.
 Canonan or Canon Lake—10,000 S1.
 Card Lake—20,000 S1.
 Franey Lake—8,000 S2.
 Holbert Lake—10,000 S1.
 Indian Lake—Gold River—10,000 S2.
 Lewis Lake—10,000 S2.
 Maligeac or Malaga Lake—20,000 S1, 12,000 S2.
 New Germany Lake—12,000 S1.
 Ninevah Lake—15,000 S2.
 Oakland Lake—10,000 S2.
 Pernette Lake—12,000 S2.
 Rocky Lake—Lahave River, between New Germany and Caledonia—10,000 S2.
 Veinot brook—5,000 S2.
 Wentzell Lake—12,000 S2.
 Whalen Lake—8,000 S3.
 Whetstone Lake—18,000 S1.
 Wild Cat River—10,000 S1.
 Wiles stillwater—Lahave River—6,000 S2.
 Lake William—20,000 S1.

YARMOUTH HATCHERY

Digby County—

Dean brook—100,000 S1.
 Carrying Road Lakes—5,000 S4.
 Grosses Coques River—80,000 S1.
 Long Tusket Lake—1,168 S1.
 Meteghan River and tributaries—80,000 S1, 25,000 S2.
 Nigger or Negro Lake—5,000 S4.

Payson's Meadow—5,000 S4.
 Riviere-a-Margo—15,000 S2.
 Salmon River—106,800 A1, 30,000 A2, 62,000 A3, 9,900 A4.
 Salmon-river Lake—50,000 S1.
 Seven Pence Ha'penny River—5,000 S4.
 Silver River—5,000 S4.
 Springwater Lake—5,000 S4.

YARMOUTH HATCHERY—*Concluded*

Victor Lake—10,000 S2.
Wentworth Lake—30,000 S2.

Shelburne County—

Barrington River—2,500 S4.
Beaverdam brook—2,500 S4.
Big brook—2,500 S4.
Black brook—2,500 S4.
Clemons pond—2,500 S4.
Clyde River—80,000 A2, 31,547 A3, 16,460 A4.
Dexter's Mill pond or Dexter Lake—1,900 S4.
Granite Village brook—1,500 S4, 1,000 S5.
Roseway River—5,000 S4.
Wall brook—600 S4.

Yarmouth County—

Argyle brook—25,000 S2.
Bullerwell brook—Carleton River—15,404 S1.

Burrell brook—38,000 S1.
Butler or Chegoggin Lake—2,290 Sf.
Coldstream River—29,539 S2.
Dove Lake—568 Sf.
Ellenwood Lake—30,000 S1.
Hanf brook—Carleton River—9,228 S1.
Harding brook—Carleton River—9,228 S1.
Jesse Lake—12 Rk.
Mood brook—Salmon River—50,000 S1.
Nickerson brook—Salmon River—18,456 S1.
Randal brook—25,000 S2.
Reynard bridge—Carleton River—15,000 S2.
Ryerson brook—Carleton River—18,456 S1.
Salmon River, Gardner brook—15,000 S2.
Sweeney brook—Carleton River—9,228 S1.
Trefry Lake—80,000 S1.
Tusket River and tributaries—110,000 Sd, 75,000 S1, 11,973 S2, 15,000 S3, 5,000 S4.

NEW BRUNSWICK

CHARLO HATCHERY

Charlo River, north branch—2,097 Sf.
Hariman Lake—20,000 Sc.
Jacquet River—70,000 A2.
Middle River—3,000 Sf.
Nipisiguit River—130,000 A1, 70,000 A2.

Restigouche River—130,000 A1, 315,000 A2.
Kedgwick River—105,000 A2.
Little Main River—105,000 A2.
Matapedia River—130,000 A1.
Upsalquitch River—192,710 A1, 50,444 A3.

FLORENCEVILLE HATCHERY

Carleton County—

Acker brook—Saint John River—20,000 Sd.
Ash brook—Fewer Lake—20,000 Sd.
Beaver pond—Shiktahawk River—143 Sf, 100 sh.
Becaguimec River—125,000 A1.
Birmingham brook—Becaguimec River—20,000 Sd.
Bubar brook—Saint John River—20,000 S1.
Bubby brook—Saint John River—15,000 Sd.
Bulls creek—Saint John River—50,000 S1.
Bull creek—Eel River—20,000 S2, 250 Sf.
Burnt Land brook—Becaguimec River—30,000 Sd, 40,000 S1.
Burpee brook—Big Presquile River—75,000 S1.
Buttermilk creek—Saint John River—5,000 Sd.
Colton brook—Shiktahawk River—6,000 Sd, 10,000 S1.
Cross creek—Becaguimec River—15,000 Sd.
Day brook—Becaguimec River—20,000 Sd, 20,000 S1.
Debec brook—Bull creek—30,000 Sd, 40,000 S1, 250 Sf.
Dingee brook—Presquile River—10,000 S1.
Dingee brook—Little Presquile River—4,000 Sd.
Gallivan brook—Little Presquile River—10,000 Sd.
Gibson Mill brook, north branch—Saint John River—600 Sg.
Gin brook—Becaguimec River—25,000 Sd, 15,000 S1.
Guisiguit River—75,000 S1, 594 Sh.

Little Guisiguit River—70,000 S1.
Glassville Beaver ponds—Coldstream brook—180 Sg, 70 Sh, 50 Sk.
Hagerman brook—Meduxnekeag River—20,000 Sd.
Hardwood brook—Saint John River—10,000 Sd.
Harmon brook—Saint John River—20,000 Sd.
Second or Upper Howard brook—Becaguimec River—25,000 S1.
Lanes creek—Saint John River—20,000 Sd.
Lily brook—Saint John River—25,000 Sd.
Mallory brook—Saint John River—10,000 S1.
Maynes brook—Little Presquile River—25,000 Sd.
McLeary brook—Lakeville pond—25,000 Sd, 50,000 S1.
McLeod brook—Bull creek—60,000 S1.
Meduxnekeag River—150,000 A1.
Mile brook—Saint John River—2,000 Sd.
Second mile brook—Presquile River—50,000 S1.
Miramichi River, southwest and tributaries—360,000 A1.
Monquart River—60,000 A1.
Presquile River—150,000 A1, 10,000 A3.
Priest brook—Priest pond—4,000 Sd.
River des Chutes—30,000 Sd, 564 Sk.
Saint John River—200,000 S1.
Shiktahawk River—50,000 A1.
Little Shiktahawk River—25,000 A1.

Carleton County—

Smith brook—Becaguimec River—10,000 Sd.

FLORENCEVILLE HATCHERY—*Concluded*

Smith pond—Southwest Miramichi River— 30,000 S1.	Second Eel Lake—20,000 S2.
Sucker brook—Lakeville pond—20,000 Sd.	Keswick River—100,000 A1.
Tweedie brook—Saint John River—3,000 Sd.	Jones creek—Keswick River—450 Sf.
White Marsh brook—Saint John River— 100,000 S1.	Longs creek—Saint John River—15,000 S2.
	Mactaquac River—70,000 A2.
	Manzer Mill stream—Nashwaak River— 42,000 S1, 400 Sg.
<i>Charlotte County—</i>	Middle brook—Nashwaak River—200 Sf, 150 Sg.
Birch Cove ponds—655 Sf.	Nackawic River—100,000 A1.
Kerr Lake—8,533 S3, 15,444 S4.	Nashwaak River—50,000 A1, 90,000 A2, 400 Sf.
<i>York County—</i>	Nashwaakis River—42,000 S1, 250 Sg.
Brown Lake—500 Sh.	Pokiok River—15,000 S2.
Clinch brook—Little Magaguadavic Lake— 5,540 Lf, 400 Lg.	Risteen Lake—25,000 S1.
Cranberry Lake—300 Sg.	Rusagonis River—50,000 S1, 400 Sg.
Cross creek—Nashwaak River—60,000 S1, 400 Sg.	Shogomac River—75,000 S1.
Davidson Lake—40,000 S1, 600 Sg.	Skiff Lake—30,000 A1, 5,525 Lf, 405 Lg.
Dead creek—Eel River—25,000 S1, 300 Sf.	Taffa Lake—30,000 S1.
	Tay River—200 Sg.

GRAND FALLS HATCHERY

<i>Victoria County—</i>	Pokiok brook—30,000 Sd, 25,000 S2.
Jardine brook—25,000 S2.	Trout brook—5,000 S3.
Beaver brook—20,000 Sd.	
Saint John River and tributaries—190,000	<i>Madawaska County—</i>
Ad, 1,140,000 A1, 20,000 A2, 62,094 A3.	Baker brook—40,000 S1.
Four Falls brook—20,000 Sd.	Baker Lake—60,000 S1, 25,000 S2.
Hatchery brook, above falls—2,460 S3.	Caron Lake—61,000 S2.
At mouth—10,000 S1.	Grand River—85,000 Sc, 25,000 S2, 3,000 S3.
Below falls—5,000 Sc, 8,842 Sd, 15,000 S1.	Green River—85,000 Sc, 60,000 S1, 50,000 S2.
Little River—115,000 Sc, 138,540 S1, 5,000 S3.	Headwaters—49,471 S2, 529 S3.
Big brook—30,000 Sc.	Above dam—25,000 S2.
Deadwater or Dead brook—20,000 Sc.	Deadwater—60,000 S1.
Poitras brook—20,000 Sc.	Iroquois River—60,000 S1.
Salmon River and tributaries—370,000 Ad, 20,000 A2, 36,000 A3.	Ledges pond—20,000 S1.
Little Salmon River—30,000 Ad.	Trout brook—60,000 S1, 25,000 S2.
Mooney brook—50,000 Sc.	Unique Lake—60,000 S1, 20,000 S2.
Sutherland brook—70,000 Sc, 30,000 Sd.	<i>Restigouche County—</i>
Tobique River and tributaries—60,000 Ad, 178,900 A2.	Five Fingers brook—
Cedar brook of Big Cedar brook—20,000 Sd.	Narrow brook—20,000 Sd.
	Lake Rond, Temiscouata County, Quebec— 12,000 S3.

MIRAMICHI HATCHERY

Bartibog River—25,000 Sd, 4,800 S3.	Long brook—17,500 Sd.
Black River—20,000 Sd, 6,000 S1, 4,800 S3.	Miramichi River, little southwest—792,000 A1, 18,200 A2.
Burnt Church River—20,000 S1.	Napan River—10,000 Sd.
Grand Aldouane River—20,000 S1.	Pokemouche River—20,000 S1.
Miramichi River, northwest and tributaries— 1,155,000 Ad, 27,600 A1, 149,428 A3.	Tabusintac River
Miramichi River, southwest and tributaries— 140,000 Ac, 630,000 Ad, 379,500 A1, 160,000 A3.	Eskelellie River—25,000 Sd, 4,800 S3.
Black brook—20,000 S1.	Little Tracadie River—20,000 S1.
Burnt Land brook—17,500 S1.	Tweedie's Meadow brook—28,000 Sd, 4,000 S1, 101 S3.

SAINT JOHN HATCHERY

Atlantic Biological Station, St. Andrew's, New Brunswick—124 S4, 3 Sg, 1 Sh, 1 Sk.	Campbell brook—Pollett River—15,000 S1.
<i>Albert County—</i>	Crooked creek—26,000 R1, 10,288 R3.
Bustin brook—Pollett River—10,000 S1.	Little or Coverdale River—345 Sf.
	McFadden Lake—5,000 S1.

SAINT JOHN HATCHERY—*Continued*

North River—Shepody River—16,200 R1, 5,000 R3, 2,952 Rf.
 Pollett River—230 S5.
 Prosser brook—Little or Coverdale River—230 S5.
 Silver Moon Lake—1,000 S2.
 Turtle creek—35,000 S1, 380 Sg, 20 Sh.
 Wallace brook—Pollett River—15,000 S1.
 West River—Shepody River—16,200 R1, 5,000 R3, 2,969 Rf, 25,000 Sd.

Charlotte County—

Birch Cove ponds—200 S4.
 Bog brook—Digdeguash River—8,000 S2.
 Burny Lake—10,000 S1.
 Campbell brook—Digdeguash River—16,000 S2.
 Chamcook Lake—40,000 L1, 7,750 L4, 1,479 Lf, 2,950 Lg.
 Clarence brook—Digdeguash Lake—10,000 S2.
 Clear Lake—25,000 A2.
 Craig brook—Craig Lake—4,000 S2.
 Denny stream—20,000 S1.
 John Diffin brook—Digdeguash River—6,000 S2.
 Digdeguash River, N.W. branch—15,000 Sd.
 Disappointment or Mistake Lake—20,000 Sc.
 Doyle Lake—8,000 S2.
 Eel brook pond (Grand Manan Island)—5,000 S2.
 Falls brook—Digdeguash River—16,000 S2.
 Gallop stream—Oak Bay—20,000 S1.
 Goat brook—Canoose River—15,000 Sd.
 Little Goat brook—Canoose River—15,000 Sd.
 Green Brown brook—Canoose River—15,000 Sd.

Johnson Lake—4,602 S4.
 Leonard pond (Deer Island)—5,000 S2.
 McCarlies brook—Waweig River—12,000 S1.
 McGuires brook—Waweig River—12,000 S1.
 McKenzie brook—South Oromocto River—25,000 S1.
 Meadow brook—Oak Bay—8,000 S1.
 Mohannas creek—15,000 Sd.
 Montgomery brook—Digdeguash River—4,000 S2.
 Murchie brook—Denny stream—15,000 Sd, 8,000 S1.
 New River—40,000 Sd.
 Potter Lake—988 Sf.
 Red Rock Lake—30,000 S1.
 Rigley brook—Waweig River, east branch—4,000 S2.
 Rollingdam brook—Digdeguash River—4,000 S2.
 Sandy brook—Canoose River—15,000 Sd.
 Seal Harbour pond (Grand Manan Island)—5,000 S2.
 Soap brook—Mohannas creek—5,000 Sd.
 Spear's brook—Trout Lake—14,293 S4.
 Trout Lake—14,384 S4.
 Twin Lake—2,200 Sf, 400 Sg.
 Utopia Lake—80,000 Sd, 50,000 S2

Kent County—

Buctouche River—345 S5.
 Coal Branch River—345 S5.
 Kouchibouguac River—345 S5.

McGinnis brook—Kouchibouguac River—345 S5.
 McKee Mills stream—345 S5.
 Saint Nicholas River—348 S5.
 Salmon River—345 S5.

Kings County—

Cedar camp stream—Trout creek—10,000 S1.
 De Corsey Lake stream—10,000 Sd.
 Dee brook—Smith creek—7,500 S1.
 Hammond River—35,000 Sd.
 Hammond River, head of—10,000 S1.
 Harry brook—Trout creek—2,860 Sd, 12,140 S1.
 Holmes brook—Sharp brook—20,000 S1.
 Kennebecasis River—40,000 A2.
 Kennebecasis River (Mechanic Settlement)—360 Sf.
 McLeod brook—Penobsquis River—15,000 S1.
 Mechanic Lake—Pollett River—1,500 Sf.
 Mitchell's brook—Kennebecasis River—15,000 A2, 3,400 A3.
 Moss Glen Lake—2,500 S2.
 Ox Shoe Lake—1,000 S2.
 Parlee brook—Trout creek—10,000 S1.
 Portage brook—Kennebecasis River—20,000 S1.
 Prices brook—230 S5.
 Sally brook—Smith creek—1,500 S1.
 Stone brook—Kennebecasis River—15,000 S1.
 Trout creek—Kennebecasis River—15,000 A2.
 Wetmore Lake—2,500 S2.

Queens County—

Forks stream—Canaan River—345 S5.
 Lake stream—Salmon River—10,000 Sc.
 McKenzie Lake—1,000 S2.
 O'Neil Lake—1,000 S2.

Saint John County—

Back Dam—Saint John River—5,000 S2.
 Beaver brook—Mispick River—17,000 S1.
 Black River—20,000 Sd.
 Blackall Lake—1,500 Sf.
 Boaz Lake—10,000 S2.
 Brandy brook—10,000 S1.
 Clear Lake—5,000 A2.
 Dead brook—Loch Lomond—40,000 Sd.
 Dolan Lake—2,507 Sf.
 Douglas Lake—23,000 S1.
 Elderly brook—Little River—9,000 S1.
 Germaine brook—20,000 Sd.
 Graham Lake—5,000 S2.
 Hanford brook—20,000 Sd.
 Hayns Lake—12,000 S2.
 Henry Lake—30,000 S1.
 Kelly Lake—Saint John River—10,000 S2.
 Lands or Quinn Lake—10,000 S2.
 Lily Lake—Rockwood Park—5,000 S1, 400 Sf, 249 Sg, 266 Sh, 369 Sk.
 Little River—185,000 Ac, 20,000 S2, 2,603 Sf, 570 Sg, 81 Sh, 179 Sk.
 Second Lake—Loch Lomond—25,000 Sd.
 Third Lake—Loch Lomond—30,000 Sd.
 Mackins Lake—6,000 Sc.
 McCracken Lake—30,000 S2.
 Millican Lake—8,000 S1.

SAINT JOHN HATCHERY—*Concluded*

Mispek River—30,000 Sd.
 Lake Retreat—20,000 Sc.
 Robinson Lake—1,000 S3.
 Southern Lake, lower—8,000 S1.
 Stoker Lake—10,000 Sc.
 Treadwell Lake—27,000 S1.
 Wilmot stream—Loch Lomond—25,000 Sd.

Sunbury County—

Boone brook—Northwest Oromocto River—10,000 S1.
 Hardwood creek—Northwest Oromocto River—8,000 S2.
 Oromocto River—45,000 A2.
 Otter brook—Northwest Oromocto River—20,000 S2.
 Porcupine brook—Northwest Oromocto River—12,000 S2.
 Yoho brook—Northwest Oromocto River—65,000 S1.

Westmorland County—

Anagance River—230 S5.
 Bulmer pond—4,000 S2.
 Cocagne River—25,000 Sd.
 Hall creek—Petitcodiac River—3,000 S2.
 Hayward brook—Anagance River—20,000 S1.
 North River—25,000 Sd.
 Tait brook—Memramcook River—25,000 Sd.

York County—

Big Cranberry or Harvey Lake—60,000 S1.
 Frog Lake—170 Sg, 30 Sh.
 George Lake—60,000 S1.
 Magaguadavic River—35,000 A2.
 Little McAdam brook—20,000 S1.
 Mink Lake—20,000 S1.
 Oromocto Lake—30,000 S1, 98 Sg, 99 Sh.
 Spring brook (R. Dorcas)—Big Cranberry or Harvey Lake—9,000 S1.
 Spring brook (R. Moffitt)—Big Cranberry or Harvey Lake—10,000 S1.
 Spring brook (James Vail)—Magaguadavic River—2,000 A3.

PRINCE EDWARD ISLAND

CARDIGAN PONDS

Kings County—

Bear River—6,000 S3.
 Big brook—Fortune River—6,000 S3.
 Big pond (Hermanville)—10,000 S3.
 Brudenell River—11,000 S3.
 Burge's pond—St. Peter Bay—1,000 S4.
 Cardigan River, head of—7,700 S4.
 Crane's pond—Morell River—4,000 S3.
 Creed's pond—Sturgeon River—9,000 S3.
 Finlayson's pond—Greek River—6,000 S3.
 Fox River—4,000 S3.
 Goose or Cow River—6,000 S3.
 Hay River—6,000 S3.
 Jenkin's pond—Greek River—4,000 S3.
 Leard's pond—Morell River—11,000 S4.
 McDonald's pond—North Lake—5,000 S3.
 MacLeod's pond—Murray River—6,000 S3.
 McRae's pond—Montague River—6,000 S3.
 McAulay's brook—Morell River—4,000 S3.
 McEwan's pond—Savage Harbour—5,000 S4.
 McKinnon stream—Morell River—8,000 S3.
 McLeod's pond—Midgell River—6,000 S3.
 McPherson's pond—Montague River—6,000 S3.
 Montague pond (Electric Power)—6,000 S3.
 Montague River—11,000 S3.
 Mooney's pond—Morell River—6,000 S3.
 Morell River—16,000 A1, 15,000 A3, 11,400 A4.
 Munn's brook—Brudenell River—5,000 S3.
 Naufrage River—8,000 S3.
 North Lake—6,000 S3.
 Poole's pond—Montague River—4,000 S3.
 Priest pond (Bayfield)—6,000 S3.
 Quigley's pond, Head of St. Peters Bay—5,000 S3.
 Sturgeon River—5,000 S3.
 Webster's pond—Marie River—9,000 S4.
 Wiginton's brook—Boughton River—6,000 S3.

Prince County—

Barbara Weit River—6,000 S3.
 Cain's stream—Mill River—10,000 S3.
 Clark's pond—Wilmot River—8,000 S3.
 Davison's pond—Southwest River—8,000 S4.
 Dunk River—10,000 S3.
 Enmore River—4,000 S4.
 Gard's pond—Mill River—8,000 S4.
 Green's stream—Miminegash pond—8,000 S3.
 Marchbank's pond—Kildare River—5,000 S3.
 McArthur's pond—Foxley River—4,000 S4.
 McKenzies' pond (Baltic)—4,000 S3.
 McWilliam's pond—Pierre Jacques River—8,000 S4.
 Myer's pond—Miminegash pond—8,000 S3.
 Myrick's pond—Little Tignish River—5,000 S3.
 St. Nicholas pond—Sunbury Cove—8,000 S4.
 Sheen's pond—Trout River (Tyne Valley)—4,000 S4.
 Sheep River—6,000 S4.
 Tignish River—9,000 S3.
 Tuplin's pond—Indian River—8,000 S3.
 Old Woollen Mills pond—Tryon River—6,000 S3.
 Wright Leard's pond—Dunk River—8,000 S3.

Queens County—

Andrew's pond—Hunter River—4,000 S4.
 Ballem's stream—Pownall Bay—4,000 S4.
 Beer's pond—Clyde River—8,000 S4.
 Belle River—15,000 S3.
 Cook's pond—Newton River—5,000 S3.
 Hardy's pond—Winter River—15,000 S3.
 Hope River—12,000 S3.
 Howell's brook—West River—6,000 S4.
 Lane's brook—Vernon River—4,000 S4.
 Leard's pond—Pisquid River—10,000 S3.
 McMillan's pond—Vernon River—5,000 S4.

CARDIGAN PONDS—*Concluded*

McMillan's pond (Wood Islands)—8,000 S4.	Skye brook—West River—6,000 S4.
McNeil's pond (Cavendish)—5,000 S4.	Southwest River—5,000 S4.
McPherson's pond—Pinette River—8,000 S3.	Stevenson's pond—Rustico Harbour—6,000 S4.
McPherson's pond—Flat River—8,000 S3.	Watt's stream—Winter River—10,000 S4.
Parson's pond—Glynde River—12,000 S3.	West River—10,000 S3.
Ross' pond—Vernon River—8,000 S4.	Winter River—9,000 S3.
Simpson's pond—Hope River—8,000 S3.	Winter River, north branch—5,000 S3.

KELLY'S POND HATCHERY

King's County—

Big brook—Fortune River—24,000 S1.	Doyle stream—Little Miminegash pond—6,000 S1.
Big pond (Hermanville)—18,000 S1.	Dunk River—18,000 S1.
Brudenell River—5,000 S1.	Fitzgerald's pond—Grand River—5,000 S1.
Crane's pond—Morell River—14,000 S1.	Gordon's pond—Kildare River—10,000 S1.
Dingwell's stream—Fortune River—12,000 S1.	Ives' pond—Tryon River—4,000 S2.
East or Hillsborough River, head of—5,000 S2.	Leard's pond—Trout River tributary to Lot 10 River—5,000 S1.
East Lake (East Point)—9,000 S1.	Marchbank's pond—Trout River (Tyne Valley)—4,000 S2.
Finlayson's pond—Greek River—8,000 S1.	McAusland's pond—Mill River—10,000 S1.
Fitzpatrick's pond—Seal River—6,000 S1.	McNally's pond—Jacques River—5,000 S1.
Goose or Cow River—6,000 S1.	Nail pond—6,000 S1.
Graystone creek—Boughton River—10,000 Sd.	Rix's pond—Kildare River—10,000 S1.
Hodgson's stream—Boughton River—5,000 Sd.	Round pond (Greenmount)—5,000 S1.
Hooper's pond—St. Peter's Lake—16,000 S1.	Waddell's pond—Traverse Cove—5,000 S1.
Larkin's pond—Naufrage River—20,000 S1.	Webster's pond—Augustin Cove—5,000 S1.
Leard's pond—Morell River—25,000 Sd.	
MacLeod's pond—Murray River—8,000 S1.	<i>Queens County—</i>
Mallard's pond—Souris River—6,000 S1.	Bagnall's pond—Hunter River—10,000 Sd.
Marie River—24,000 A1.	Black River—Tracadie Bay—8,000 Sd.
McAskill River—5,000 S1.	Black River—Covehead Bay—5,000 S2.
McInnis' pond—Souris River—5,000 S1.	Brander's pond (Seaview)—4,000 S1.
McKinnon stream—Morell River—10,000 Sd.	Callaghan's pond—East River—4,730 S1.
McRae's pond—Montague River—10,000 Sd.	Clark's stream—East River—12,000 S1.
Midgell River—75,000 A1.	Coles' pond—North River—10,000 Sd.
Montague River—15,000 Sd.	Cousins pond (Seaview)—5,000 S1.
Montague pond (Electric Power)—12,000 Sd.	Craswell's pond—Hunter River—10,000 Sd.
Morell River—150,000 Ad, 231,310 A1.	Crooked creek—Wheatley River—5,000 S1.
Narrow creek—Boughton River—6,000 Sd.	Dixon's pond—De Sable River—24,000 Sd.
Naufrage River—12,000 S1.	Found's pond—Old Mill River—5,000 S1.
Ross' pond—Boughton River—18,000 Sd.	Gates' pond—North River—5,000 Sd.
Head of St. Peter Bay, below Quigley's pond—30,000 A1.	Holms' pond—De Sable River—5,000 Sd.
Warren's pond—Head of East or Hillsborough River—8,000 S1.	Howell brook—West River—5,000 S2.
Warren's pond—Little Harbour—5,000 S1.	Johnston River—10,000 Sd.

Prince County—

Bain creek—4,000 S1.	McAulay's stream—Tracadie Bay—6,000 Sd.
Barlow pond—Grand River—5,000 S1.	McLean Brothers pond—West River—5,000 S2.
Beaton stream—Percival River—5,000 S1.	Miller's brook—East River—6,000 Sd.
Bell's stream—Prevost Cove—5,000 S1.	Pickett's pond—East River—4,000 S2.
Bell's stream—Mill River—8,000 S1.	Rackham's pond—Wheatley River—15,000 S1.
Black pond (Horse Head)—8,000 S1.	Southport (Kelly's pond) hatchery pond—860 S2.
Brae River—5,000 S1.	Stordy's pond—Crapaud River—12,000 S1.
Cannon's pond—Smelt River—4,000 S2.	West River—20,000 S1.
Carr's stream—Malpeque Bay—5,000 S1.	Winter River—8,000 S2.
Clark's pond—Wilnot River—9,000 S1.	Wisner's or Weisner's pond—East River—2,500 S1.
Conroy's pond (Cape Kildare)—5,000 S1.	
Currie's pond—Lit. Pierre Jacques River—10,000 S1.	

APPENDIX No. 4

**REPORT ON OYSTER-CULTURE WORK UNDER THE DEPARTMENT
OF FISHERIES FOR THE YEAR 1942-43**

BY

C. J. KERSWILL

Fisheries Research Board of Canada

This year oyster culture work was continued by the Department of Fisheries in Prince Edward Island, Nova Scotia and New Brunswick. In Prince Edward Island the work has been in progress since 1928, in Nova Scotia since 1934. In 1932 investigations were begun in the Shediac area of New Brunswick but after 1933 development was postponed owing to uncertainties regarding public health control. In 1940 the Shediac investigations were resumed and limited work was begun in other parts of New Brunswick. This was continued in 1941. In 1942 considerable assistance was given the Provincial Government in administration and technical advice in the Shippigan vicinity.

The general organization and aims of the work in each province may be found in appendices of previous annual reports of the Department of Fisheries since 1930.

Since the outbreak of war, the value of oysters on the Canadian market has increased owing to the embargo on importations from the United States and in some districts there has been even greater interest in oyster farming than formerly. There is a continued demand for the leasing of new areas, often by those wishing to develop an occupation for relatives returning after the war. While shortage of labour for oyster farming operations is arresting the expansion of oyster farming, there was some increase in the production this year because of the determined and organized efforts of available personnel. Many lessees of long standing, whose expenditures have exceeded their receipts since the beginning of the work, are now realizing substantial profits. Continuous supervision and encouragement of oyster farming is required since work must be done now to ensure production in about five years' time, and private effort should not be much reduced. As a result of shortage of labour, production of spat by private individuals is likely to decrease. The department may be of increasing assistance to oyster farmers by continuing to produce seed stock for sale and thus assist in the development of leased areas.

A.—PRINCE EDWARD ISLAND

Despite the war, private oyster farming was continued on almost the same scale in 1942-43 as in the past several years. Although limited mostly to the Malpeque-Cascumpeque region, a considerable effort was made in Bedeque Bay where large quantities of oysters were fished on public beds in Summerside harbour and relayed to outside leases for purification. Oyster mortalities are still retarding development in the Charlottetown region and elsewhere but in some affected areas attempts are being made to re-establish the industry by planting Malpeque oysters resistant to the disease. In other outlying districts oyster farming was continued on a very small scale.

Malpeque-Cascumpeque Region.—Having probably the greatest potentialities of any region in eastern Canada, but left almost barren by a mortality of oysters commencing in 1915, the present program of oyster farming was first

established here. Preliminary investigations were commenced in 1928 and scientific research on oyster cultivation methods in 1929. Leasing of grounds for oyster culture was started in the autumn of 1931. Although the benefits of experimental farming and other work of the department have been felt directly here, both scientific results and administrative experience are largely applicable elsewhere.

As shown in Table I the quantity of oysters marketed from private areas in 1942 exceeded last year's production by over 1,300 barrels. This is the result of the increased effort in oyster farming since 1935. Owing to shortage of personnel, expenditures have been reduced during the war years and this year receipts have exceeded total expenditure by about \$15,000. Since about five years are required to produce high quality marketable oysters by spat collection and rearing, less activity now might be expected to cause lower returns in several years' time. The decreased expenditure this year does not indicate as great a reduction in work as might be supposed, because in 1942 collectors of the previous year were used for the second time, owing to the failure in spat production in 1941. Besides this saving, the expense of rearing spat on floating trays has been overcome recently in some areas where rearing can be carried out successfully on the shore. Further, the growth of oysters on some leases in deep water is unusually slow and many such areas have been well stocked but they are just now beginning to produce marketable oysters. Unless a still more acute labour shortage occurs it is probable that production can be maintained at its present level.

Continued effort is needed in administration, in further improvement of oyster culture methods, and in education of oyster farmers in these methods. As the industry develops, administrative policies require frequent adjustment. As shown in Table I, even in this region where the industry has developed farthest, total expenditures since 1935 have still exceeded total receipts by about \$69,000.

Regions Affected by Mortality.—The reports on oyster culture from 1938-39 to 1941-42 review the history of the serious mortalities of oysters which have occurred since 1936 in the Charlottetown region and in Enmore and Percival rivers, and the evidence of the resistance of Malpeque stock.

Owing largely to the results of investigations which indicate that Malpeque oysters are resistant to the disease, interest in oyster farming as a means of re-establishing oyster production in affected inlets increased in 1942. Since the public fishery was destroyed in the tributaries of Hillsborough Bay, and in Enmore and Percival rivers, the introduction of Malpeque stock on leased areas seems to offer the only hope of re-establishing the industry. The natural production of small oysters on the areas suggests a natural recovery, but this may be misleading since high mortalities have occurred among such oysters before they reached marketable size.

At Johnston's and Enmore rivers, where Malpeque oysters were transplanted in 1939, the department is attempting to establish sources of resistant stock. Malpeque stock is also made available to oyster farmers in affected areas through the sale of spat and small oysters from the department's reserve in the Malpeque Bay region.

Bedeque Bay.—In 1942 about 2,137 barrels of oysters were relaid from Summerside harbour to Salutation, Sedgwick, and Sunbury coves for purification, as compared with 1,335 barrels in the previous year. Of these about 1,975 barrels were refished as compared with 1,065 in 1941. The natural production of small oysters on public fishing areas in Bedeque Bay is increasing and there are good prospects for still greater production. In the past two years the Summerside fishery has operated satisfactorily. Large catches have been marketed successfully after careful handling and grading by several

dealers who have purchased oysters from the fishermen and relaid them in large quantities.

Provision of Planting Stock.—Both separated spat and small oysters are offered for sale to lessees by the department to assist in the stocking of leased areas, especially in outlying districts. An effort is made to assist as many lessees as possible but preference is given lessees who are not yet established. The service is especially valuable to those in areas affected by disease where it is desired to establish the resistant Malpeque stock. In 1942, 193 barrels of small oysters were sold, as compared to 133 in the previous year. No separated spat was available for sale owing to the general spat failure in 1941.

In the Malpeque-Cascumpeque, Bedeque Bay, Enmore-Percival, and other regions the policy of issuing permits to lessees to pick oysters for stocking purposes in the shallow shore zone was continued. This supervised picking has resulted in the transfer of large quantities of oysters to leases in deeper water, thereby saving them from winter killing and at the same time providing well-shaped planting stock to lessees.

B.—NOVA SCOTIA

The agreement by which the Dominion Government obtained jurisdiction over oyster areas in Nova Scotia was not completed until 1936. Intensive work did not commence until that year, therefore development of oyster areas is at an earlier stage than in Prince Edward Island. Diversion of effort to war purposes has retarded development to some extent and actual private oyster farming has been undertaken on only a small scale as yet.

There are two oyster-producing regions, the Bras d'Or Lakes and the Gulf of St. Lawrence coast, having conditions and problems widely different from each other and from the north shore bays of Prince Edward Island. It has been necessary to carry out extensive investigations with a view to adapting cultural methods to the special local conditions of the different regions.

BRAS D'OR LAKES

In 1934 a preliminary survey of the oyster areas of the Bras d'Or Lakes was undertaken but intensive investigation was not attempted until 1936 and ground was first offered for lease in 1937. Reserves of good fishing grounds were set aside for the public fishery and leases which had already been issued by the Provincial Government were continued in force whenever the lessee so desired. Unless the marketing of oysters in the Bras d'Or Lakes can be improved permanently the general prospects for profitable oyster culture are not very good. Natural spat production is good and satisfactory methods of spat collection have been developed. The oysters, however, are of relatively low value because of weak shells, thin meats, and fresh flavour associated with the low salinity of the water. Owing to the low value of the product attempts are being made to develop the cheapest possible methods of production. For example, experiments have shown that spat may be successfully collected on brush.

Marketing Problems.—Low prices are generally realized when Bras d'Or Lakes oysters are sold in the shell and, since the market for them is uncertain, attempts to improve production are discouraged. As the production of high quality oysters on leased areas is increased elsewhere the marketing of Bras d'Or Lakes stock may not be expected to improve.

Since relatively good oysters for sale in the shell cannot be produced in this region, another outlet was sought in 1939 when the Department of Fisheries and the Nova Scotia Marketing Board co-operated in exploring the possibility of marketing shucked Bras d'Or Lakes oysters in bulk. Details of the 1939

trials are given in the report on oyster culture for that year. Although the yield of oyster meat per barrel was low and a return of only \$1.50 per barrel was realized, the quality of the product was high enough to compete with oysters imported from the United States. Repetition of the experiment in 1940 gave a higher return of \$2.70 per barrel by reduction of labour costs and improvement in marketing.

In the past two years, largely because of the embargo on United States' importations, much higher returns were realized. In 1941, 409 barrels of oysters produced 480 American gallons of oyster meats, an average yield of about 1.2 gallons per barrel. These sold for \$5.24 per gallon, giving a net return of \$4.90 per barrel.

In 1942 the yield increased to about 1.5 gallons per barrel, 809 barrels giving 1,188 American gallons. As a result, although the average price received per gallon was \$5.30 (about the same as in 1941), and labour costs were slightly higher, the greater net return of about \$6 per barrel was realized. Prospects for the marketing of shucked oysters are, therefore, very good at the present time and the demand for the product considerably exceeds the supply.

Leasing of Oyster Grounds.—Only grounds believed to be capable of producing relatively good oysters are leased, following careful examination by a representative of the department. At the end of 1941-42, 192 applications for oyster leases had been received, of which 184 were approved and surveyed and 148 completed as leases. At the end of 1942-43 the total had reached 211 of which 196 had been approved and surveyed and 164 completed as leases.

Development of Leased Areas.—The development in 1942 of private oyster areas in the Bras d'Or Lakes is summarized in Table II. Comparison with a similar table for 1941 given in the report for that year shows that the cash expenditure was increased and slightly more work was done. More oysters were planted and the sales were increased by 32 barrels. Practically all the small oysters which were obtained by lessees and planted on their areas were picked in shallow water along the shores under permit. Provision by the department for such picking of small oysters from areas where they would ordinarily be subject to winter killing is of great advantage to lessees in the Bras d'Or Lakes area where inexpensive stocking methods are especially required.

NORTHUMBERLAND STRAIT

This region differs from both the Bras d'Or Lakes and the north shore of Prince Edward Island in having much larger tides and extensive intertidal flats with their special problems. Conditions are generally suitable for the production of higher quality oysters than in the Bras d'Or Lakes owing to higher salinities, and production rather than marketing is the chief problem. Following a preliminary survey of the region in 1936, intensive investigations were commenced in 1937 at Malagash, where areas have been reserved for experimental farming. Problems of spat production have been generally solved there and there are now good prospects of producing spat for sale to lessees in other parts of the region. Results of the experiments are reported in greater detail in the section below on experimental farming and investigations.

Leasing of Oyster Grounds.—No leases are being issued of areas now producing oysters in commercial quantities and such grounds are left for public fishing. To the end of 1941, 73 applications for leases had been received, of which 62 were approved and 61 surveyed. By the end of this year the total had reached 76 applications with 72 approved and 69 completed.

In Table II the development of private oyster farming in this region in 1942 is summarized. Development has been retarded by uncertainty regarding

methods suited to the local conditions, by the limited sources of planting stock, and by diversion of effort caused by the war. Continued progress is being made in Tatamagouche Bay, Caribou Harbour, and East River and in the past two years considerable development has occurred in Merigomish Harbour. In 1942 the relaying of oysters from dangerously polluted parts of Pictou Harbour was continued and about 246 barrels were relaid and 171 fished again.

C.—NEW BRUNSWICK

In New Brunswick only the Shediac area was transferred to Dominion jurisdiction in 1931 and no further transfer has been made. Work was carried on at Shediac in 1932 and 1933 but was discontinued owing to the uncertainty of the public health situation. Further investigations were made in 1940 and 1941 and this year it was decided that a small experimental farm should be established there. Operations on this are to begin in 1943, and experiments in rearing spat from Orangedale and Malagash are planned. There is a demand for increased work elsewhere in New Brunswick, especially in Kent, Westmorland, Northumberland, and Gloucester counties. In 1942 the New Brunswick Department of Lands and Mines was assisted by the department in the examination of applications for oyster leases and educational work was begun especially in the Shippigan vicinity.

Public Health Problems.—A considerable proportion of the public fishing grounds at Buctouche, Cocagne, and Shediac have been found by the Department of Pensions and National Health to be so dangerously polluted that direct marketing of oysters during open water is prohibited. Provision for the use of oysters from polluted areas is necessary for the maintenance of the public fishery.

In 1940 investigations in co-operation with the Department of Pensions and National Health indicated that the bacterial content of oysters in polluted areas is so reduced during the winter that oysters from some of these areas may be safely marketed then. Part of the polluted areas can be fished through the ice and the situation has been relieved to some extent.

In 1940-41 investigations were commenced to develop the best possible technique for the relaying of polluted oysters in relatively pure water and their recovery for the market. The expense of this process, though not prohibitive, is sufficient to remove much of the profit and further experiments were carried out in 1942 on Prince Edward Island with a view to the reduction in the difficulty and cost of relaying. The results of these experiments will be applicable to New Brunswick. Thus far they are encouraging and should be continued.

Development of Oyster Farming.—Investigations of the potentialities of the region with regard to oyster farming were commenced in 1940 and were continued in 1942. As discussed below in "Results of Investigations and Experiments" an urgent need for spat collection was found in the Shippigan vicinity. Educational work among lessees is very desirable and oyster farming circulars are being distributed to them in French as well as English. Plans are also under way for assistance by the department in spat prediction at Shippigan in the coming year.

D.—GENERAL

REVENUE

Revenue from oyster culture for the past five years is summarized in Table III. After increasing steadily to 1939-40 there was some reduction in 1940-41 because of lower production on the department's experimental areas in Prince Edward Island. Increased production and higher market prices in

1941-42 were largely responsible for increased revenue to \$9,900, the highest to be realized thus far. In 1942-43 the revenue from the sale of marketable oysters was lower since there was a reduced sale of the lowest or standard grade, for which the demand was considerably less than heretofore. There was also no revenue from the sale of separated spat owing to the general spat failure throughout the Maritime Provinces in 1941. This year, however, more small oysters were sold for stocking areas in outlying districts than in the previous two years and such assistance to oyster farmers is the primary function of the department's experimental areas.

Although the revenue from oyster culture goes to consolidated revenue and cannot be spent on oyster culture it reduces the cost of the work to the government considerably below the total expenditure. The appropriation in 1942-43 exclusive of cost-of-living bonus was approximately \$23,500. Through economy the expenditure was limited to \$19,000 and the revenue reduced the net cost to about \$11,500.

As in previous years revenue was largely from Prince Edward Island. Excluding general expenses equally applicable to all provinces and amounting to about \$1,500, the estimated net cost of the work in 1942-43 is about \$800 in New Brunswick, about \$5,400 in Nova Scotia and only about \$3,800 in Prince Edward Island. Thus, although the total volume of work is greater in Prince Edward Island the greater revenue reduces the net cost below that in Nova Scotia where development is still at an early stage.

Investigations and Experimental Farming

The department co-operates with the Fisheries Research Board in experiments and investigations designed to develop and demonstrate the best methods for oyster culture. Headquarters are at Ellerslie where the Prince Edward Island Biological Station, established by the Board, is conveniently located near the department's areas which have been reserved for experimental oyster farming. Here the department can test on a commercial scale new methods which are suggested by the scientific investigations.

Information on the life history of the oyster, the control of pests, and other general topics, has widespread application. There are, however, special problems in oyster farming methods which must be solved in other localities. Thus, investigations of problems peculiar to the Bras d'Or Lakes and the Gulf of St. Lawrence coast of Nova Scotia are conducted at Orangedale and Malagash, N.S., respectively. Experimental farms are operated there by the department to determine and demonstrate suitable farming methods and to provide planting stock to assist new lessees. At these centres and elsewhere scientific investigations are conducted to as great an extent as possible, being limited by expenses and the availability of trained personnel.

The increasing development of oyster farming in outlying areas requires a corresponding expansion of scientific investigations. There are, also, many unsolved problems in areas where oyster farming is now well established and further improvements in methods are always desirable.

Results of Investigations and Experiments.—Since the investigations are presented in greater detail in bulletins and circulars of the Fisheries Research Board, only a brief review is given here.

In 1942 predictions of the settlement of oyster spat were made in the Malpeque-Cascumpeque, Enmore-Percival, Orangedale, and Malagash regions. Weather conditions were largely favourable for the successful settlement and growth of the spat. In addition to assisting private oyster farmers with collection of spat a sufficient quantity was produced by the department for sale to lessees in outlying districts. In connection with the spat prediction work our knowledge of the free-swimming stage of the soft-shelled clam was extended.

The effect of relaying on the condition of oysters is important since much relaying from polluted areas and from rearing grounds to maturing grounds is practised. Further experiments showed that even the disturbance caused by fishing and replanting oysters on their native beds improved their fatness at all seasons. The maximum beneficial effect was produced when replanting was done before the fall fattening period commenced. Down-river oysters are generally fatter than up-river and transfer down river is beneficial.

More intensive studies of the effect of temperature, water circulation, exposure and other factors on the growth rate of oysters were begun. It is believed that after repetition and expansion of the experiments next year, and comparison with previous work, information of considerable value to the industry will be available. The 1942 results indicate that young oysters commence growth in the spring when the water temperature reaches 10° C. and grow most rapidly during the summer period of highest temperatures. Adult oysters grow most rapidly in the spring at temperatures below 20° C. after which a lag occurs during spawning. Little growth occurs in both large and small oysters after the temperature has fallen below 20° C. in the autumn. Water circulation appears to be one of the most influential factors affecting growth.

The self-purification of sewage-contaminated oysters was investigated in co-operation with the Department of Pensions and National Health by experimental relaying from Summerside Harbour to Sedgewick Cove. The results are of practical importance in indicating that the cleansing period can be considerably reduced below the present requirement of one month. Self-purification proceeds satisfactorily on flats exposed at low tide where relaying and recovery are less costly than at lower levels.

Still more conclusive evidence was obtained that Malpeque oysters are resistant to the disease that is responsible for serious oyster mortalities in Prince Edward Island. As a result lessees in affected districts were encouraged to stock their areas with Malpeque oysters in preference to native spat. Regular observations were made also on the natural recovery of oyster populations in affected areas.

Investigations were continued at Malagash, N.S., on the cultivation of oysters on flats exposed at low tide and on rearing oysters in deeper water. Experiments to determine the cause of high winter mortalities suggested that mechanical damage by ice was not an important factor. Laboratory experiments to test the effect of fluctuations of salinity and temperature on oysters towards the end of the hibernation period were commenced at St. Andrews, N.B. Oysters which had been planted for four years in a deep water bed in Tatamagouche Bay showed considerable improvement in shape and good survival. An early and heavy set of spat was obtained on collectors hanging in the basin and the yield was sufficient to serve as a supply to lease-holders for the first time in 1943. A channel in the salt marsh, having a clean firm bottom, was dammed and promises to be a good location for wintering collectors.

In the Bras d'Or Lakes experiments were continued to test the efficiency of collecting and rearing oysters on brush. Observations in 1942 on oysters collected in 1939 showed that growth was rapid since many had reached marketable size and the stock might be suitable for shucking or for stocking leases. A heavy set of spat on brush was again obtained in 1942. Further experiments on the production and marketing of shelled oyster meats gave still more encouraging results than were suggested by earlier tests.

Tests of the efficiency of several commercial products in protecting wood against shipworm attack showed that spruce lumber can be protected by two coats of "Osno-cro", "Osmose-cresote Paint", and "Cuprinol". A single coat of Copper paint and double coats of Tar-Copper-Oleate mixture were effective but a single coat of the latter was insufficient.

The New Brunswick Government was assisted by the department in the examination of oyster leases in Northumberland and Gloucester counties and in connection with this work a study was made of the populations of oysters in the Shippigan vicinity which have served as a source of seed for leases. Practically all the oysters on the beaches were either four or five years old and natural production of seed is, therefore, unreliable. The need for spat collection and educational work is emphasized. Plans were made for experimental farming on a small scale by the department in Shediac Bay, to which transfers of oyster spat from Orangedale and Malagash are being made in 1943 to determine their growth and survival both on trays and on the bottom of the departmental reserve.

The exploration of oyster areas was continued in the three Maritime Provinces preliminary to the leasing of oyster grounds and the development of suitable administrative policies.

Grading and Inspection

In 1940 a survey was made of the grading and packing of oysters on the Canadian Atlantic coast. An urgent need for improvement was found since many different grade designations were used in various ways and the cleaning and packing of oysters was often very poor. After interviewing a majority of the packers four grades were defined as regards shape from measurements of oysters considered to be graded satisfactorily. These grades were called "Fancy", "Choice", "Standard", and "Sub-standard".

In 1941 regulations were passed requiring these grade names to be used only on oysters which had been inspected and approved by one of the department's officers. Regulations were also passed with a view to improving and standardizing the general packing of oysters. The fishery officers were instructed in the new regulations to enable them to instruct the producers in grading and packing. For the past two years an inspector has checked and reported upon oyster shipments arriving at Montreal and has interviewed buyers. In this way it has been possible to judge the effectiveness of the inspection in various parts of the Maritime Provinces and to determine whether further changes in the regulations are necessary.

As a result of the new regulations there was marked improvement in the 1941 pack of oysters and the buyers were well satisfied. The careful checking of shipments at Montreal showed where helpful criticism could assist some packers and inspectors. The 1942 product was improved still further and buyers now recognize the government grades as giving a true indication of the quality to be expected in a container. As oyster farming continues to increase production, still greater attention must be given to the grading and packing of the product to ensure the sound expansion of marketing.

Public Health

The general relationship between the oyster industry and public health as well as purification experiments at Buctouche are discussed in the Report on Oyster Culture for 1940-41. In 1942 further experiments on the relaying of oysters from a polluted area were made at Summerside Harbour and the results have been discussed above.

Further examination of oyster areas by the Department of Pensions and National Health resulted in several minor changes in the boundaries of areas considered to be dangerously polluted opening parts of several producing areas to direct marketing. The present definition of closed areas may be found in the fishery regulations.

TABLE I.—OYSTER FARMING IN THE MALPEQUE-CASCUMPEQUE REGION,
1937-1942

	1935	1938	1940	1941	1942	*Total 1935-42
1. Barrels of oysters planted.....	1,303	5,968	5,337	3,392	4,580	32,744
2. Concrete-coated spat collectors used (egg-crate fillers).....	3,350	98,000	82,500	51,824	28,610	405,184
3. Barrels of oysters sold.....	979	3,451	3,251	3,187	4,538	21,671
4. Receipts from sale of oysters (esti- mated at \$9 per bbl. 1941, 1942; \$8 previously).....	\$7,832	\$27,608	\$26,008	\$28,683	\$40,842	\$181,093
5. Wages paid by oyster farmers.....	\$2,137	\$17,971	\$12,485	\$11,533	\$ 8,538	\$ 87,613
6. Money spent for materials used.....	\$1,665	\$27,484	\$ 8,914	\$10,696	\$10,155	\$101,592
7. Total cash expenditure.....	\$3,802	\$45,455	\$21,399	\$22,229	\$18,693	\$189,205
8. Days' work by lessees or unpaid assistants.....	1,126	7,022	5,085	4,326	4,077	34,572
9. Value of (8) at \$1.75 per day.....	\$1,971	\$12,289	\$ 8,899	\$ 7,570	\$ 7,134	\$ 60,502
10. Total expenditure.....	\$5,773	\$57,744	\$30,298	\$29,799	\$25,827	\$249,707
11. Excess of total expenditure over re- ceipts.....	—\$2,059	\$30,136	\$ 4,290	\$ 1,116	—\$15,015	\$ 68,614
12. Excess of cash expenditure over re- ceipts.....	—\$4,030	\$17,847	—\$ 4,609	—\$ 6,454	—\$22,149	\$ 8,112

* Includes 1936, 1937 and 1939 figures, which are not shown in detail.

TABLE II.—DEVELOPMENT OF OYSTER AREAS UNDER CULTIVATION IN
NOVA SCOTIA IN 1942

Region	Number areas under cul- tivation	Approx- imate total area	Oysters planted	Oysters sold	Wages paid for develop- ment	Money spent for materials	Days' work by lessees	Value of time by lessees at \$1.75 per day	Total value of work and materials
		(acres)	(bbl.)	(bbl.)	\$	\$		\$	\$
Bras d'Or Lakes.....	137	244	205	450	24	655	515	899.50	1,578
Merigomish Harbour...	25	96	215	376	970	330	277	429	1,729
East and West rivers, Pictou Co.....	10	27	247 ¹	149	163	887	95	166	1,216
Caribou Harbour.....	11	33	73 ²	35	.....	445	22	38	483
Tatamagouche Bay.....	10	32	.....	29	25	159	15	26	210
Wallace Bay.....	6	14	.....	7	13	195	.....	.....	208
Total, Northumber- land Strait.....	62	204	535	596	1,171	2,016	409	659	3,486
Grand Total.....	199	448	740	1,046	1,195	2,671	924	1,558	5,424

NOTE.—(1) Including 246 bbl. relaid.

(2) Including 49 bbl. relaid.

TABLE III.—REVENUE FROM OYSTER CULTURE, 1942-43

	1942-43	1941-42	1940-41	1939-40	1938-39
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Sale of cardboard collectors bearing spat				367 20	505 20
Sale of 17 bundles collectors with spat at 75c.				12 75	
Sale of wire containers for spat collectors				3 10	36 20
Sale of separated spat—336-2/7 gal. at 70c.			235 40		
Sale of separated spat—337-8 gal. at 65c.		154 60			
Threshing spat from 1,004 collectors at 2c. each			20 08		
Threshing spat from 1,860 collectors at 1½c. each		27 90			
Sale of 193 bbl. small oysters for stocking areas at \$3.	579 00	400 50	78 00	333 00	579 00
Sale of marketable oysters from experimental farm:					
75 bbl. substandard at \$8.10 (1941-42 only)		607 50			
337 bbl. standard at \$8.65 (\$8.10, 1941-42)	2,915 05	4,471 20	2,908 80	2,202 60	1,510 00
72 bbl. 3 pks. choice at \$11.65 (\$10.75, 1941-42)	842 30	742 41	917 70	2,287 60	1,196 00
53 bbl. fancy at \$14.10 (\$13.26, 1941-42)	747 30	822 12	1,377 80	1,729 18	1,293 78
Sale of 13 bbl. oysters from St. Ann bay, N.S.					57 32
Sale of 18 bbl. oysters from Malagash, N.S.		100 80			
Sale of 3 bbl. 3 pks. oysters from Buc-touche at \$5 (\$6, 1940-41)		16 50	216 00		
Sale of 68 gal. of spat from Bras d'Or Lakes at 50c.		34 00			
Logs purchased from Department by H. V. Carr		15 00			
Fees for resurveys of boundaries of leases	5 00	4 00		27 50	21 50
Royalty on oysters taken from leases and rentals on leases	*2,494 14	2,503 69	2,308 50	2,044 01	1,758 27
Total	7,582 79	9,900 22	8,062 28	9,007 14	6,957 27

* Not final.

APPENDIX No. 5

ANNUAL REPORT OF THE ENGINEERING BRANCHBy C. BRUCE, M.E.I.C., *Chief Engineer*

The duties of this branch include all technical works coming within the purview of the department in the Maritime Provinces, British Columbia and the Northwest Territories, where the fisheries are entirely, or largely, under federal administration. These works include the removal of obstructions from streams which impede or prevent the ascent of fish to suitable spawning grounds; the design and supervision of construction of fishways; the design and supervision of construction of cold storage plants and other buildings in connection with the fishing industry; surveys, designs and supervision of construction of fish cultural establishments and administration of oyster cultural work, including the leasing of ground for oyster farming in the Maritime Provinces

BUILDING FISHWAYS AND CLEARING RIVERS

Works under this head include: (a) surveys and the preparation of designs for adequate fishway facilities for dams which prevent the ascent of fish to suitable spawning grounds and to overcome natural falls or impassable barriers to their ascent, and (b) the removal of artificial obstructions. Where dams are privately owned the owners or occupiers are required to install and maintain adequate fishway facilities therein, in conformity with the requirements of the Fisheries Act, but, as those not conversant with the design of fishways are quite unlikely to provide structures that will prove efficient, it has been the policy of the department to require that all fishways shall be built in accordance with designs prepared by the Engineering Branch. This involves a study of each situation and, after the collection of data and the completion of the necessary ground surveys, the design of a fishway to best meet the conditions peculiar to the situation.

The removal of artificial obstructions includes many varieties of work depending on the nature and extent of the barriers. In many streams accumulations of debris of various kinds resulting from land slides, forest rubbish or even large trees which have fallen into the water as a result of freshets undermining the banks, as well as materials resulting from logging operations, may so obstruct the open water as to make the upstream progress of fish difficult and even impossible under certain stages of water. Many such conditions require immediate action to insure that channels shall be open to permit the season's run of fish to ascend as otherwise adequate seeding of the spawning areas would be entirely prevented. Through the activity of local fishery inspectors and guardians, logging operators, in general, are giving greater care to the disposal of their slash and waste, when it is likely to menace areas drained by streams frequented by fish, as they have been brought to realize that it is less expensive to arrange from the commencement of operations to keep streams clear of fallen materials and culled logs than to be required to return afterwards and clean up the debris. Jams and barriers of various kinds will, however, continue to form through natural agencies and if their removal is not undertaken at an early stage they are liable in the course of time to become heavy accumulations the removal of which might well involve large expenditures.

Discontinuance of fish cultural operations for the propagation of salmon on the Pacific coast has resulted in attention being focussed on the preservation, improvement and development of natural spawning grounds, which are to be found in the great number of streams draining the British Columbia coastline. In many instances these streams are difficult of access but before any improvement of conditions for the ascent of fish past either natural or artificial barriers is undertaken, they are explored for some length to determine whether suitable gravel beds exist of sufficient extent to provide spawning grounds that will give promise of returns commensurate with the cost of contemplated improvements.

Unless obstructions are of a major character, such as to require the advice of an engineer, it is the usual practice to undertake their removal under the supervision of the local fishery inspector after the need has been established.

No major obstructions occurred during the year and the works undertaken are classified and reviewed hereunder:—

NOVA SCOTIA

North River, St. Annes, Victoria County.—Reference was made in the 1941-42 report to work in connection with the construction of a fishway to provide for the ascent of salmon over a falls on this river, and that it had not been possible to economically continue the work to completion due to abnormally high water conditions. Further progress was made in clearing out the rock excavation for the fishway during the past summer and it was found that salmon were having little difficulty in ascending even without the contemplated concrete partitions. In the circumstances it has been decided to defer further work.

McQuarrie's Brook, Inverness County.—An obstruction, composed of river drift which had become embedded in over-hanging alders fringing the stream in such a manner as to completely bar the ascent of fish, was removed.

West Brook, Cumberland County.—As debris had accumulated completely blocking the opening through which fish ascended in an old unused dam, it was decided, in order to prevent this occurring again, to remove part of the dam entirely.

Medway River, Queens County.—An examination was made of the locality at Harmony Mills on this river where the Nova Scotia Power Commission is proceeding with the construction of a hydro-electric power development. After more complete information regarding the final diversion of water for the development had been obtained, a design for a fishway was prepared and submitted to the commission, which is responsible for the installation.

Nictaux River, Annapolis County.—An instrumental survey was made, at the site of a small dam which has been built in this river, to obtain information for the design of a fishway. Further information as to the extent to which salmon are prevented from ascending by the dam will be obtained before a decision, as to the need for the fishway, is reached.

A screen was installed across the entrance of a by-pass channel at the mouth of the Clyde River, Shelburne County, to prevent ascending salmon and trout from entering and direct them up the main river. A screen was also installed to prevent salmon from entering a tidal pond at the mouth of Round Hill River, Annapolis County, where they are liable to be poached when the tide is low.

Inspections were made of the several fishways in dams in Petite Riviere, and of one on Nine Mile River, Halifax County. An attempt was made to construct a small concrete wall to form a fishway for a dam at South Brookfield in the Medway River, but high water conditions made it necessary to postpone the work.

BRITISH COLUMBIA

Atnarko River, Bella Coola Area.—Work in this river consisted of the removal of all manner of river drift and debris which had lodged in the main channel at points where the banks are low or practically absent, so that any impediment causes most of the flow to be diverted into a number of small broken channels which find their way through irregular courses until they join the main channel at some point downstream. Salmon cannot find their way through these except during high water which does not usually exist during the sockeye spawning migration. Due to the difficulty of labour conditions most of the work was done by using powder, which proved to be more effective and less laborious than cutting and taking the material out by hand.

Babine Lake Streams.—The streams entering this lake provide the principal spawning ground for salmon in that area. For several years it has been realized that obstructions, consisting of log jams and drift, were reducing the effectiveness of these spawning grounds and, as conditions were gradually deteriorating so as to endanger them entirely, it was decided to proceed with the removal of the obstructions. The streams cleared included Hatchery, Grizzly, Twin, Pierre and Tachez creeks, the work being performed by Indian labour.

Beaver Creek tributary to Fraser River.—Obstructions are caused in this stream through the banks adjacent to the channel sliding after freshets, carrying stumps and debris which form accumulations at the bends. Such accumulations were removed during the year and it is possible that a recurrence may necessitate some work each season.

Big Qualicum River.—A large log jam which exists in this river about four miles from tide water was channelled two years ago but due to accumulations which had effectively blocked the ascent of salmon it was necessary to re-open the channels.

Removal of obstructions, which involved either the removal of or channelling through log jams, was undertaken in Cameleon Creek in the Quathiaski area; Coal Creek in the Sooke area; Gark, Hemming and Coal creeks in the Comox area; Evans Arm Streams and Tom Bay River in the Bella Bella area; Genesi River in the Rivers Inlet area; Klaskish and San Josef rivers in the Quatsino area and Sewell Inlet stream in the Queen Charlotte Islands.

Colony Lake Creek, Quatsino Area.—The obstruction in this creek consisted of three falls in close proximity, near the mouth, which obstructed the runs of salmon to spawning grounds above. At the falls nearest the mouth the channel was widened, all projecting spurs of rock were removed and a pool created at the foot to give salmon an opportunity to make the run. At the second falls a channel 27 feet long, with a minimum width of two feet, was cut to form a by-pass and the pool at the foot of the channel was enlarged. At the upper falls a graded channel 35 feet long with a minimum width of three feet was blasted out of the rock to provide a means for salmon to ascend during low water periods and to afford an easier passage during normal and freshet conditions. The pool at the foot of these falls was also enlarged by the removal of several large rocks.

In addition to the foregoing, openings were made in two large beaver dams and other obstructions removed between the falls and Colony Lake.

Skutz Falls fishway, Cowichan River.—Small repairs to the retaining wall below the fishway were completed and large accumulations of debris in and about the fishway were cleaned up and burned. The work was done at no cost with the assistance of men from a nearby camp maintained under the supervision of the Forestry Department for conscientious objectors.

Stamp Falls Fishway.—During the winter of 1941-42 freshets carried a large tree or log downstream, breaking away one of the compartment walls. This was repaired with concrete.

FISH CULTURAL ESTABLISHMENTS

No new establishments were built during the year, but it was necessary to continue maintenance and in some instances to improve the existing facilities where this was in the interests of efficiency. The works are reviewed hereunder:

NOVA SCOTIA

Antigonish Hatchery.—It was necessary to renew the timber bridging which supports the 20-inch diameter pipe line where it is carried across a ravine on concrete piers.

Bedford Hatchery.—An examination of the water supply dam on the Sackville River was made and an estimate of the cost of repairs prepared. The work will be undertaken during the coming year.

Cobequid Hatchery.—The water supply pipe to the outside rearing troughs was re-arranged by eliminating elbows thus increasing the volume of flow to this system.

In the early autumn a severe freshet in Second River caused considerable damage to the water supply dam. Old logs and debris, and even old wooden driving dams on the upper river, were washed down against the dam, completely blocking the spillways and gates and causing such a rise of water that the earthen embankment forming the right wing was washed out for a length of some 48 feet. The volume of water thus released scoured out the river bank below and gradually exposed and washed out some 88 feet of the 18-inch wood stave supply pipe to the hatchery. Some small damage was also done on the left wing of the dam but, as the river bank at that point is high, no actual washout occurred. It was necessary to repair the damage to the dam with a stone filled cribwork 48 feet long and 10 feet high, sheathed on the upstream face. While some of the pipe was damaged it was all salvaged and the greater part of it was replaced in the line. A stone filled cribwork was built along the river bank to protect the pipe.

Coldbrook Rearing Ponds.—A battery of four rearing troughs, each 14 feet by 15 inches wide and 10 inches deep, with the necessary head trough and pipe line for water supply, was installed.

Grand Lake Ponds.—The water supply dam, which was a rock-filled cribwork structure, had become so decayed that it was necessary to practically rebuild it. At the same time the flume to the rearing ponds which had been of timber construction was renewed with reinforced concrete, and the fishway in the dam was rebuilt.

Kejimikujik Rearing Ponds.—The water supply dam at the outlet of Grafton Lake was repaired.

Lindloff Hatchery.—The timber foundations supporting the flume from the water supply dam, which had become badly decayed, were renewed.

Margaree Hatchery.—Some repairs were undertaken to the floors of the barn and garage, including new joists and sills, and a road was built to give access by truck to rearing ponds located across the main road from the hatchery proper. The corners of the rearing pond property were re-established by survey and part of the property was also enclosed with a fence to prevent the access of cattle.

Mersey Rearing Ponds.—A suspension foot-bridge was built across the tailrace canal, from the Nova Scotia Power Commission hydro-electric development, to give more convenient access to the ponds. The commission gave much appreciated assistance in this work.

River Phillip Salmon Pond.—The old concrete dam on the river has been used in conjunction with the fishway to capture parent salmon for the collection of eggs. This dam, which was formerly used for power purposes, is gradually disintegrating and it has been necessary for the past three or four years to do some repairs. The planned procedure is to build cribwork to replace the worst places in the dam as they occur so that in the course of time the entire structure will be rebuilt. Some work along these lines was already completed and it was necessary to build another section during the year. As the lower end of the fishway had been broken away, it was replaced with concrete.

When operations at this place started some years ago a temporary spawning shed and living quarters for the watchman and staff were built, as it was not desired to put up more permanent buildings until the success of operations was established. As neither building warranted the expense that would be involved in repairs which were badly needed, it was decided to erect new ones. The spawning shed is 14 feet by 30 feet with concrete foundations and contains a stripping room with the necessary work tables and cold water supply and a hardening room with three egg hardening tanks each four feet by eight feet through which cold water circulation is supplied. The living quarters are 14 feet by 20 feet containing a living room and two small bedrooms for the staff.

Yarmouth Hatchery.—It was necessary to renew the two large supply troughs and six hatching troughs in the hatchery.

When this hatchery was built a well was dug but as the quality of the water was such that it was not suitable for domestic use, this supply was obtained by a connection to the hatchery pipe line. As it was necessary to renew this pipe connection and as the well supply was found to have improved, the service was connected to the well.

PRINCE EDWARD ISLAND

Morell Salmon Pond.—When the property for this establishment was acquired some years ago there was an old landing wharf on it, which has been used in connection with the operations of the salmon retaining pond. This structure gradually deteriorated and it was necessary to renew it. At the same time needed repairs to the living quarters were completed.

NEW BRUNSWICK

Florenceville Hatchery.—An examination revealed that serious decay had occurred along the east wall of the hatchery building and it was necessary to rebuild it. In the reconstruction the wall was built of concrete up to the lower end of the windows to prevent a recurrence of the trouble. Structural changes were also made to the roof of the sub-hatchery which showed signs of settling.

Saint John Hatchery.—Due to increased use of the rearing pond facilities it was necessary to provide an additional supply of water. The existing supply has been built up gradually, as the rearing pond system was extended, by diverting small sources of water into the system, which was augmented by an 8-inch pipe from the main reservoir. As this was proving insufficient it was decided to install a 14-inch wood stave pipe from the reservoir with branch pipes, 12-inch and 8-inch, to the two pond systems. The 14-inch pipe was laid and the balance of the work will be completed during the coming year.

Inspections.—While no special visits of inspection were undertaken, an engineer in the course of his work inspected the hatcheries at Middleton, Miramichi, New Mills Salmon Pond and Grand Falls. He also made a preliminary survey of a site at Halfway River, N.S., which fish cultural officers had suggested might be suitable for the establishment of a rearing pond system.

OYSTER CULTURE

The leasing of ground for oyster culture in Prince Edward Island and Nova Scotia was continued during the year under review.

During the year 135 leases were completed in Prince Edward Island, making a total of 1,111 since leasing commenced in 1932. For various reasons 446 leases have been cancelled or abandoned by the lessees, leaving a total of 665, having a combined area of 1,604 acres, in effect. It is considered probable that some of the cancelled leases will be reinstated. In addition, 753 applications were before the department for consideration. Some of these are for ground where leasing has not as yet been approved and the list also includes applications in areas where the prospects are not regarded as the best.

In Nova Scotia 31 leases were completed, making a total of 233 issued since leasing commenced in 1938. Cancellations and abandonments totalled 28, leaving 205 leases, having a combined area of 478.5 acres, in effect, while 97 applications were being given consideration.

The action on an application for a lease includes investigation of the area it covers in order that the applicant may be advised of the prospects before proceeding. Following approval of the application, the area is surveyed and a proper description prepared for inclusion in the lease. Various factors may cause delay, after an application is received, before the lease is completed. Climatic conditions may be unsuitable for examining the ground or for making the survey or the applicant may delay in proceeding after being notified of approval of his application. Such delays account to some extent for the relatively large number of incomplete applications.

A total of 103 surveys for new areas and 22 re-surveys of leased areas, where the boundary markers had become lost, were completed in Prince Edward Island, while in Nova Scotia 23 surveys for new areas were undertaken. Additional survey work included:—

1. The areas in Malpeque Bay, where the picking of small oysters is allowed under permit, were laid out and marked.

2. A triangulation survey was made of that part of Darnley Basin in which areas to be surveyed for leases were located.

3. Due to erosion and frost action it occasionally happens that concrete monuments, which were placed around Malpeque Bay for the purpose of locating the boundaries of leaseholds, become displaced. During the year it was necessary to replace monuments numbered 24, 29, 47 and 55. Triangulation surveys were made to establish the new relationship of these monuments with the grid system, from which leased areas are defined.

4. The boundaries of areas in Sunbury Cove, closed to the direct marketing of oysters due to contamination, were established and marked.

5. The position of an area in Shediac Bay, which will be reserved for experimental purposes, was located.

6. As no suitable maps or plans of that part of the Bras d'Or Lakes where oyster farming may be undertaken are available, it has been necessary to conduct surveys to obtain the necessary data for the preparation of such plans. During the year 1941-42 surveys of North and South basins, River Denys, were completed and this survey was extended eastward last year as far as Jamesville.

The work includes the establishment of triangulation stations for controls and stadia surveys for the location of the shoreline.

A detailed report of oyster culture work will be found in Appendix No.

GENERAL

In order to obtain definite information regarding the freezing and holding capacities of cold storage plants in the Maritime Provinces, which are used for fish, an engineer inspected and measured the capacities in the following plants,—Black's Harbour, Caraquet, Charlo, Chatham, Inkerman, Kouchibouguac, Loggieville, Moncton, Newcastle, Petit Rocher, Richibucto, Saint John, Shippegan, Tracadie, Canso, Halifax, LaHave, Liverpool, Lockeport, Lunenburg, Mulgrave, North Sydney, Port Hood, Port Mouton, Queensport, Shelburne, Stellarton, Yarmouth, Charlottetown, Ellerslie, Georgetown, Kensington, Northam, O'Leary, Parks Corner, Souris and Summerside. Complete information regarding the methods of operation at each place was obtained.

Proposed sites for the erection of fish curing buildings at Richibucto, Richibucto Cape, Point Sapin and Escuminac were examined by an engineer, and designs for the buildings and equipment were subsequently prepared.

The site of a proposed cold storage plant at Lameque, was examined and preliminary plans of the plant were completed.

A situation at Jamesville, where it was represented that a gravel bar prevented the circulation of tidal salt water into a pond where oysters occur, was examined. It was found that the maintenance of a permanent channel through the bar was not economically practicable but that with a very limited amount of labour after storms, which close the channel, it could be kept open sufficiently to achieve the desired results.

The Engineering Branch dealt with all correspondence in connection with the department's oyster cultural work in the Maritime Provinces as well as that in connection with engineering works both there and in British Columbia.

An engineer represents the department, as a member of the committee on cold storage which is a sub-committee of the Food Requirements Committee, under the Department of Munitions and Supply.

APPENDIX No. 6

**REPORT ON THE WORK OF THE PACIFIC CANNED FISH INSPECTION
LABORATORY, VANCOUVER, BRITISH COLUMBIA,
FOR THE YEAR 1942-43**

by F. CHARNLEY, Chief Chemist

As pointed out in the annual report for the year 1941-42, the extension of the duties of the Canned Fish Inspection Laboratory to include the inspection of canned herring has materially reduced the time available for research and for work on special problems. Notwithstanding this, however, very satisfactory progress has been made during the past year with the latter phase of the work.

The most valuable results obtained by the laboratory during the year 1942-43 have been the discovery of methods of measuring the freshness of canned salmon and canned herring. The first of these investigations, which was carried out in the spring of 1942, has shown that the acid value of the oil of canned herring affords an accurate measure of the amount of incipient spoilage that has taken place in the herring prior to canning. By applying the statistical results mentioned in the 1941-42 annual report, it has been found that acid values of the oil of canned herring and examiner's organoleptic ratings for freshness are related through a linear, composite, bivariate distribution. The total range in acid value from fresh to tainted samples is about 8.2 standard deviations in the individual codes.

On the basis of these results the following tolerances for freshness of canned herring have been set up:

Average Acid Value of Oil	Grade	Size of Re-Sample drawn from each Suspected Code
Less than 2.25.....	A	6
2.25 to 2.75.....	B	6
Greater than 2.75.....	Below Grade B	6

These tolerances have been employed during the past season to corroborate the gradings based on the examiner's organoleptic ratings for freshness as set forth in table nine, page 183 of the 1937-38 annual report of the Department of Fisheries.

The accuracy of the acid value of the oil as a measure of the freshness of canned herring has been confirmed by further experience of the laboratory with this test and by the work of a certain large herring canner in British Columbia. The results obtained by the latter show that the acid value of the oil of canned herring increases in direct proportion to the length of time the herring are kept in the brining bin under given conditions, and that as the acid value increases the odour and other organoleptic evidence indicates the onset of spoilage. The industry has thus been provided with a means of controlling the freshness of canned herring, so that only under very unusual circumstances is there now any excuse for the industry to submit parcels of canned herring containing malodorous samples or samples showing evidences of bacterial reddening.

The second of these investigations, which was carried out in October and November, 1942, has shown that the carbon dioxide value forms a reliable measure of the freshness of canned salmon. This test was first applied by two

Russian scientists, Lyubin and Lebedeva, in measuring the freshness of meat. By means of a simplified procedure for determining carbon dioxide values, it was found, as in the case of the acid value of the oil of canned herring, that there is a close association between the examiner's organoleptic ratings for freshness of canned salmon and the carbon dioxide value of the drained salmon muscle tissue. There is a wide range in carbon dioxide value between fresh samples and tainted samples, as determined by means of an examiner's organoleptic ratings, but owing to the relatively large standard deviation in the individual codes, the range in carbon dioxide value between fresh and tainted samples, when expressed in standard deviations, is somewhat less than the corresponding range in acid value of the oil of canned herring.

The following tolerances for freshness of canned salmon based on this test have been set up by the laboratory for checking the gradings of this characteristic determined on the basis of examiner's ratings:—

Average Carbon Dioxide Value	Grade	Size of Re-Sample drawn from each Suspected Code
Less than 0.130.....	A	6
0.130 to 0.180.....	B	6
Greater than 0.180.....	Below Grade B	6

Further data on the pH value of the aqueous liquid in canned salmon show that this characteristic, like examiner's ratings for freshness, is influenced by the seasonal condition of the salmon in addition to the amount of incipient spoilage that has taken place in the fish at the time of packing. Used in conjunction with the carbon dioxide value, however, this characteristic gives valuable information regarding the sexual maturity of the salmon at the time of canning.

The above tests for freshness have provided the industry with convenient and reliable means of controlling the freshness of canned herring and canned salmon. Also, these tests will greatly reduce the cost for re-samples and re-sampling, when the industry and the department feel ready to substitute these tests for the examiner's organoleptic ratings given in the above-mentioned table.

Experience during the past year has shown that the industry cannot be relied upon at all times to process properly canned salmon and canned herring, since at least one undercooked and non-sterile parcel of canned salmon was discovered by the laboratory in 1942. As a result of this, the laboratory has instituted incubation tests for suspected codes, and a further extension of these tests is contemplated, when the laboratory has been provided with the proper facilities for carrying out the tests.

During the past year time has also been devoted to a number of other problems. Work has been carried out on a rapid method of determining acid values of the oil of canned herring by means of the titration curve. Additional data on the fall in refractive index of the oil of canned herring with the seasonal maturity of the fish have been collected. Equations describing a second-degree, composite, bivariate distribution have been applied in describing the relation between the intensities of the red and yellow colours of the muscle tissue of canned sockeye salmon. Lastly, a considerable amount of time has been spent by the writer in the preparation of manuscripts of papers reporting the results of certain of the above investigations.

REPORT OF THE CANNED FISH INSPECTION LABORATORY, HALIFAX, N.S., FOR THE YEAR 1942-43

By ERNEST HESS, PH.D.

Following is a summary of the work carried out by the Canned Fish Inspection Laboratory at Halifax during the fiscal year ending March 31, 1943.

The Canned Fish Inspection Laboratory was officially established with the inauguration of the voluntary Canned Lobster Grading Regulations, by Order in Council of May 11, 1942, P.C. 3901.

Laboratory space and equipment has been provided by the Atlantic Fisheries Experimental Station of the Fisheries Research Board of Canada. The present staff consists of two junior chemists working under the direction of the writer.

Canned Lobster Grading.—A voluntary scheme of grading canned lobster was established by the Order in Council of May 11, 1942. Two lobster grading permits were issued by the Department during the year, and a total of seven lots were submitted for grading, amounting to 715 cases of 96 six-ounce cans each. Eighty per cent of these graded as "Fancy Quality", the others as "Standard Quality".

Canned Herring Inspection.—Canned herring in tomato sauce for export to the British Ministry of Food was inspected, following the scheme established by the Canned Fish Inspection Laboratory at Vancouver, B.C. Mr. R. S. Bolton, of that laboratory, introduced the inspection method to our staff, Messrs. Homans and Hollett, who later continued on their own. Inspection was begun in a temporary laboratory at Black's Harbour, N.B., on May 20, was transferred to Halifax on October 12 and continued here until December 23, 1942. A total of 214,801 cases have been inspected altogether. Of these 99.7 per cent were found to be Grade "A" and 0.3 per cent Grade "B".

Examination of Underweight Samples of Canned Lobster.—During the year eight samples, totalling 42 cans of lobster, were submitted by fishery inspectors from lots under seizure for being found underweight. The findings of the inspectors were confirmed in all cases.

Miscellaneous Canned Fish Products.—During the year twenty samples of canned fish products were submitted voluntarily to the laboratory for examination and judgment of quality and workmanship. These included herring and sardines in oil and in tomato sauce, smoked sardines, kipper snacks, chicken haddie, gaspereau, Atlantic salmon, lobster, whitefish, smoked pollock, mussels and fish chowder.

Canning Research.—The staff used the time not taken up with grading and inspection work to carry on research and experimental canning, particularly in connection with the canning of lobster, chicken haddie and mackerel. Summary accounts of the work have been published in the annual report of the Atlantic Fisheries Experimental Station of the Fisheries Research Board. Two papers have been submitted to the Journal of the Board for publication.

A systematic survey of the quality of the 1942 pack of chicken haddie has been made. Based upon this work, "Standards of Quality" and methods and regulations for the grading of chicken haddie have been drawn up. This systematic survey will be extended to the 1943 packs of all chicken haddie canneries.

APPENDIX No. 8 STATEMENT OF REVENUE RECEIVED DURING THE FISCAL YEAR 1942-43

Class	Total	General Account	Nova Scotia	P.E.I.	N.B.	Quebec	Alta.	Hudson Bay	B.C.	Yukon	N.W.T.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
<i>Privileges, Licences and Permits—</i>											
Fishing Licences.....	35,300 40		4,296 00	692 75	8,456 25	151 50		1 90	21,227 00	455 00	20 00
Modus Vivendi.....	199 00		23 00						176 00		
Oyster Leases.....	2,279 91		444 57	1,835 34							
Trawler Licences.....	3,000 00		3,000 00								
Rentals.....	5 00								5 00		
<i>Proceeds from Sales—</i>											
Sales of Pelagic Seal Skins.....	212,131 35	212,131 35									
Sales of Fish.....	295 00				295 00						
Sales of Oysters.....	5,085 15			5,085 15							
Sundry Sales.....	2,062 80	6 96	569 15	4 85	662 00	108 60	213 71		497 53		
<i>Services and Service Fees—</i>											
Canned Salmon Inspection Fees.....	9,071 45								9,071 45		
Canned Herring Inspection Fees.....	5,940 87								5,940 87		
Canned Lobster Inspection Fees.....	61 50		61 50								
Miscellaneous Services.....	5 00			5 00							
<i>Premium Discount and Exchange</i>	119 39		1 65						117 74		
<i>Refunds of Previous Years' Expenditure</i>	534 47	51 68	80 57	7 40	0 40	39 00			355 42		
<i>Miscellaneous—</i>											
Fines and Forfeitures.....	27,252 74		718 50	1,096 60	1,245 50				24,192 14		
Miscellaneous.....	25 00		5 00						20 00		
	303,369 03	212,189 99	9,199 94	8,727 09	10,659 15	299 10	213 71	1 90	61,603 15	455 00	20 00
<i>Special Receipts (War)—</i>											
Commission on sales of Japanese Vessels.....	14,236 31								14,236 31		
Survey Charges re sales of Japanese Vessels.....	2,427 00								2,427 00		
	320,032 34	212,189 99	9,199 94	8,727 09	10,659 15	299 10	213 71	1 90	78,266 46	455 00	20 00

Certified Correct,
F. O. WEEKS,
Chief Treasury Officer.

Certified Correct,
D. B. FINN,
Deputy Minister.

FINANCIAL STATEMENT DEPARTMENT OF FISHERIES, 1942-43

Vote No.	Appropriation	Amount Authorized		Expenditure	
		\$	cts.	\$	cts.
Statutory	Minister's Salary and Car Allowance.....	12,000	00	12,000	00
71 & 454	Departmental Administration.....	142,067	00	133,964	04
	(Salaries and Disbursements of Fishery Officers and Guardians.....			518,638	03
72	Fisheries Patrol Service.....	816,120	00	223,852	95
73	Fisheries Protection Service.....			21,454	73
74	Building Fishways and Clearing Rivers.....	7,000	00	2,111	14
	Development of Deep Sea Fisheries and the Demand for Fish.....	62,760	00	30,381	14
75	Salt Fish Board.....	20,000	00	4,709	25
76	Fish Culture.....	188,640	00	181,027	36
77	Oyster Culture.....	25,580	00	21,191	55
78	Fisheries Research Board of Canada.....	235,180	00	214,526	00
79 & 418	International Fisheries Commission (Halibut).....	27,100	00	25,075	97
80 & 419	International Pacific Salmon Fisheries Commission.....	42,000	00	41,607	00
81	Grant to the United Maritime Fishermen's Association.....	3,000	00	3,000	00
82	Expenses <i>re</i> Pelagic Seal Skins.....	100,000	00	74,477	56
83	Harbour Seal Bounty.....	15,000	00	7,767	50
455 & 420	International Pacific Salmon Fisheries Commission (Hell's Gate).....	23,424	00	22,594	48
Statutory	Fishing Bounty.....	159,930	60	159,930	60
Statutory	Miscellaneous Civil Service Gratuities.....	600	00	600	00
	Total Ordinary Expenditure.....	1,880,401	60	1,698,909	30
	SPECIAL EXPENDITURE				
84	Extension of educational work in co-operative producing and selling among fishermen.....	50,000	00	37,911	66
	Total Special.....	50,000	00	37,911	66
	WAR EXPENDITURE				
Statutory	War Appropriation Act, 1942—				
	Canned Lobster Control Scheme.....	3,070	29	3,070	29
	Wartime Fisheries Advisory Committee.....	300	00	23	50
	Japanese Fishing Vessels Disposal Committee.....	22,000	00	21,410	21
	Damage claims <i>re</i> Japanese Vessels.....	105,000	00	90,369	89
	Subsidy <i>re</i> Fishing Vessels Construction in B.C.....	100,000	00	61,511	55
	Construction and operation of Long Line Fishing Vessel—East Coast.....	35,000	00	193	70
	Total War.....	265,370	29	176,579	14
	Expenditures				
(a)	Pacific Halibut Treaty Special Account (Finance Department).....	\$		24,970	92
	Pacific Salmon Treaty Special Account (Finance Department).....			41,740	63
	Pacific Salmon Treaty (Hell's Gate) Special Account (Finance Department).....			22,594	50
	Province of British Columbia—Fisheries Research Board Special Account—(Finance Department).....			3,141	42
(b)	British Ministry of Food—Salmon.....			20,555,802	26
	British Ministry of Food—Herring.....			3,071,890	70
(c)	Department of National Defence (Naval Service).....			67,000	00
	Grand Total.....	\$		25,700,540	53

(a) Balances due by the United States and the Province of British Columbia at the close of the fiscal year 1942-43 on account of divisible expenditures.

(b) Purchases of Salmon and Herring for the British Government.

(c) Amount received from the Naval Services covering cost of moving the Pacific Fisheries Experimental Station of the Fisheries Research Board of Canada from Prince Rupert to Vancouver, B.C.

Certified Correct,

F. O. WEEKS,
Chief Treasury Officer.

Certified Correct,

D. B. FINN,
Deputy Minister.

SALARIES AND DISBURSEMENTS OF FISHERY OFFICERS
AND GUARDIANS

EXPENDITURE AND SUMMARY 1942-43

NOVA SCOTIA—

General	\$ 1,032 75	
Head Office	29,933 96	
District No. 1.....	40,080 21	
District No. 2.....	53,664 12	
District No. 3.....	55,380 08	
		<hr/> \$180,091 12

PRINCE EDWARD ISLAND—

General	\$ 336 06	
District No. 1.....	34,860 59	
District No. 2 (Magdalen Is.)	6,795 80	
		<hr/> 41,992 45

NEW BRUNSWICK—

General	\$ 1,117 78	
District No. 1.....	25,192 87	
District No. 2.....	61,153 10	
District No. 3.....	33,848 28	
		<hr/> 121,312 03

CANNED FISH INSPECTION OFFICE—EAST COAST..... 1,207 72

GENERAL EAST..... 3,680 89

BRITISH COLUMBIA—

Head Office.....	\$ 26,862 83	
District No. 1.....	32,374 98	
District No. 2.....	43,280 23	
District No. 3.....	45,066 52	
Canned Fish Inspection Office.....	18,057 43	
		<hr/> 165,641 99

GENERAL WEST..... 4,711 83

\$518,638 03

SUMMARY

Nova Scotia	\$181,712 65
Prince Edward Island	42,352 79
New Brunswick.....	123,600 77
Quebec	618 00
British Columbia	170,353 82
	<hr/> <hr/> \$518,638 03

DEPARTMENT OF FISHERIES

FISHERIES PATROL SERVICE

EXPENDITURES AND SUMMARY 1942-43

NOVA SCOTIA—

District No. 1			
Chartered boats	\$	919 75	
District No. 2			
Departmental boats		9,225 46	
District No. 3			
Departmental boats	\$	10,776 87	
Chartered boats		1,068 00	
		<u>11,844 87</u>	\$ 21,990 08

PRINCE EDWARD ISLAND—

Departmental boats	\$	2,643 53	
Chartered boats		5,682 52	
		<u>8,326 05</u>	

NEW BRUNSWICK—

District No. 1			
Departmental boats	\$	17,166 64	
District No. 2			
Chartered boats		15,148 73	
		<u>32,315 37</u>	

BRITISH COLUMBIA—

District No. 1			
Departmental boats	\$	22,458 38	
Chartered boats		7 79	
		<u>22,466 17</u>	
District No. 2			
Departmental boats	\$	37,880 77	
Speed boats		516 03	
Chartered boats		37,769 71	
		<u>76,166 51</u>	
District No. 3			
Departmental boats	\$	23,146 68	
Chartered boats		28,645 29	
		<u>51,791 97</u>	
Digby Island	\$	6,143 38	
Poplar Island		4,569 18	
General		84 24	
		<u>10,796 80</u>	
			161,221 45
			<u>\$223,852 95</u>

SUMMARY

Nova Scotia	\$	21,990 08	
Prince Edward Island		8,326 05	
New Brunswick		32,315 37	
British Columbia		161,221 45	
		<u>\$223,852 95</u>	

FISHERIES PROTECTION SERVICE

EXPENDITURE SUMMARY, 1942-43

West Coast	\$	21,454 73
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DEVELOPMENT OF THE DEEP SEA FISHERIES AND THE DEMAND FOR FISH

EXPENDITURE 1942-43

Aids in expanding demands for fish	\$	8,209 87
Educational Work		8,660 36
Miscellaneous		3,706 63
Subsidy to Bait Freezers		100 00
Fisheries Intelligence Bureau		1,015 31
Advertising		4,698 97
General		3,990 00
	\$	<u>30,381 14</u>

FISHERIES RESEARCH BOARD OF CANADA

EXPENDITURE 1942-43

	Expenditures		
	From Vote	From Receipts	Total
	\$ cts.	\$ cts.	\$ cts.
Atlantic Biological Station—St. Andrews, N.B.....	48,979 19	.....	48,979 19
Pacific Biological Station—Nanaimo, B.C.....	53,629 97	7,489 74	61,119 71
Atlantic Experimental Station—Halifax, N.S.....	41,015 65	.....	41,015 65
Gaspé Experimental Station—Grand River, P.Q.....	15,902 66	.....	15,902 66
(a) Pacific Experimental Station—Prince Rupert and Vancouver, B.C.....	35,584 35	67,000 00	102,584 35
Administration and General—			
Toronto Office (A. G. Huntsman).....	9,790 56	.....	9,790 56
Atlantic Salmon Investigation.....	4,737 74	.....	4,737 74
Publications.....	1,593 76	.....	1,593 76
Miscellaneous.....	3,292 12	2,514 76	5,806 88
	214,526 00	77,004 50	291,530 50

(a) Under authority of P.C. 6653 of July 30, 1942, the Department of National Defence (Naval Services) acquired the Experimental Station at Prince Rupert and reimbursed the Board to the extent of \$67,000 to cover the costs of moving the equipment and staff to Vancouver and establishing laboratories and facilities there.

STATEMENT IN CONNECTION WITH SHIPMENTS OF CANNED SALMON TO THE UNITED KINGDOM FOR WHICH PAYMENT WAS MADE IN THE FISCAL YEAR 1942-43

Grade	Size	No. of tins per case	No. of cases	Rate per case	Payments
				\$ cts.	\$ cts.
<i>Payments on balance of 1941 Pack—</i>					
1.....	$\frac{1}{2}$ lb.	96	6,536	13 75	89,870 00
	$\frac{1}{4}$ lb.	96	2,501	8 62 $\frac{1}{2}$	21,571 13
	1 lb.	48	450	12 50	5,625 00
2.....	$\frac{1}{2}$ lb.	96	5,995	10 00	59,950 00
	$\frac{1}{4}$ lb.	96	1,950	6 75	13,162 50
	1 lb.	48	8,165	8 75	71,443 75
3.....	$\frac{1}{2}$ lb.	96	22,286	6 25	139,287 50
	$\frac{1}{4}$ lb.	96	3,309	4 37 $\frac{1}{2}$	14,476 87
	1 lb.	48	42,433	5 00	212,165 00
			93,625	.....	627,551 75

Equivalent in full cases—89,745.....\$ 627,551 75

10 per cent balance paid on goods shipped from storage and on which 90 per cent payment was made in 1941-42..... 37,610 13

\$ 665,161 88

Less undercharge on 258 cases at 2 $\frac{1}{2}$ c..... 6 45

\$ 665,155 43

Payments for affixing labels at 8c. a case for half and quarter pound cans and 5c. a case for one pound cans 6,370 64

Freight payments..... 9,275 10

Storage and Insurance at 2 per cent..... 13,921 14

Interest charges at 5 per cent on payments delayed over 30 days between dates of loading on freight cars and receipt of payment..... 5,699 81

Interest charges at 5 per cent on goods delayed in shipment on account of label shortage (Dec. 1/41 to Jan. 5/42)..... 5,624 98

Interest charges at 5 per cent on freight advances..... 345 84

Total for 1941 Pack.....\$ 706,392 94

<i>Payments on 1942 Pack—</i>					
A-1.....	$\frac{1}{2}$ lb.	96	424,700	17 50	7,432,250 00
	$\frac{1}{4}$ lb.	96	68,482	10 50	719,061 00
	1 lb.	48	161,970	16 25	2,632,012 50
A-2.....	$\frac{1}{2}$ lb.	96	87,782 $\frac{1}{2}$	12 75	1,119,226 88
	$\frac{1}{4}$ lb.	96	5,562	8 12 $\frac{1}{2}$	45,191 25
	1 lb.	48	81,355 $\frac{1}{2}$	11 50	935,588 25
A-3.....	$\frac{1}{2}$ lb.	96	278,559	7 50	2,089,192 50
	$\frac{1}{4}$ lb.	96	1,866	5 00	9,330 00
	1 lb.	48	585,168	6 25	3,657,300 00
			1,695,445		18,639,152 38

Equivalent in full cases—1,657,490.....\$18,639,152 38

B-1.....	$\frac{1}{2}$ lb.	96	31,998 $\frac{1}{2}$	14 00	447,839 00
	$\frac{1}{4}$ lb.	96	3,019	8 75	26,416 25
	1 lb.	48	2,697	12 75	34,386 75
B-2.....	$\frac{1}{2}$ lb.	96	481	11 25	5,411 25
	$\frac{1}{4}$ lb.	96	24	7 37 $\frac{1}{2}$	177 00
	1 lb.	48	792	10 00	7,900 00
B-3.....	$\frac{1}{2}$ lb.	96	6,558	6 75	44,266 50
	$\frac{1}{4}$ lb.	96	65	4 62 $\frac{1}{2}$	300 62
	1 lb.	48	19,582	5 50	107,701 00
			65,216 $\frac{1}{2}$		674,418 37

Equivalent in full cases—63,662 $\frac{1}{2}$\$ 674,418 37

Total number of full cases and value of same—1,721,152 $\frac{1}{2}$\$19,313,570 75

Less deduction at 15c. a case on 210,612 cases packed in fibre cartons instead of wooden cases.....31,591 80

\$19,281,978 95

Payments for affixing labels at 8c. a case for half and quarter pound cans and 5c. a case for one pound cans.....109,466 93

Payments for labels supplied by Packers, 1,653 talls at 15c., 1,503 halves at 20c.....548 55

Payments for printing labels, including freight, etc.....136,376 01

Freight payments on shipments.....487,601 13

Payments at 2 per cent to cover storage and insurance.....5,100 68

Miscellaneous payments *re* drawing samples, clearance of cars, etc.....333 73

\$20,016,405 98

Less 5 per cent unpaid on goods stored in warehouses.....166,996 66

Total for 1942 Pack.....\$19,849,409 32

Total.....\$20,555,802 26

STATEMENT IN CONNECTION WITH SHIPMENTS OF CANNED HERRING TO THE UNITED KINGDOM FOR WHICH PAYMENT WAS MADE IN THE FISCAL YEAR 1942-43

Type of Container	Size	No. of cans per case	No. of cases	Rate per case	Payments
				\$ cts.	\$ cts.
EAST COAST					
Ovals.....	1 lb.	48	49,599	4 80	238,075 20
Rounds.....	1 lb.	48	15,426	4 60	70,959 60
Ovals.....	$\frac{3}{4}$ lb.	48	70,833	3 41	241,540 53
Sardine cans.....	$\frac{1}{4}$ lb.	100	55,187	4 25	234,544 71
			191,045		785,120 04
Payments for freight.....					23,920 90
					809,040 94
WEST COAST					
<i>Amount of 1941 Pack paid for in 1942-43—</i>					
Ovals.....	1 lb.	48	307,554	3 75	1,153,327 50
Talls.....	1 lb.	48	151,491	3 30	499,920 30
Ovals.....	$\frac{3}{4}$ lb.	48	85,427	3 10	264,823 70
			544,472		1,918,071 50
Less 10 per cent balance unpaid on fish still in storage.....					834 88
					1,917,236 62
Payments for tomato puree when supplied by the canners at 25c. per case.....					37,200 00
Payments for freight.....					123,976 34
Payments to canners to cover storage and insurance (2%).....					4,809 76
Payments to canners to cover interest on payments deferred for over 30 days between date of loading on freight cars and date of receipt of payment (5%).....					4,739 28
Miscellaneous payments for scraping cans, remarking, etc.....					337 55
					2,088,299 55
<i>Amount of 1942 Pack paid for in 1942-43—</i>					
Ovals.....	1 lb.	48	35,486	4 80	170,332 80
Talls.....	1 lb.	48	3,172	4 22	13,385 84
			38,658		183,718 64
Less 5 per cent balance unpaid on fish in storage.....					9,185 93
					174,532 71
Brokerage charges paid on tomato puree.....					17 50
					174,550 21
					2,262,849 76
Total.....					\$ 3,071,890 70

FISHERIES EXPENDITURES 1942-43 BY PROVINCES

Appropriation Title	General		Nova Scotia		Prince Edward Island		New Brunswick		Quebec		Ontario		Saskatchewan		Alberta		British Columbia		Total	
	\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.
Salaries and Disbursements of Fishery Officers and Guardsians		9,128 65		6,569 65		3,307 39		3,385 71		2,698 19		2,022 13		139 27		254 93		2,875 22		30,381 14
Fisheries Patrol Service			181,712 65		42,352 79		123,000 77		618 00								170,333 82		518,638 03	
Fisheries Protection Service			21,990 08		8,326 05		32,315 37										161,221 45		223,832 95	
Building Fishways and Clearing Rivers				465 04													21,454 73		21,454 73	
Development of the Deep Sea Fisheries and the Demand for Fish																	1,646 10		2,111 14	
Salt Fish Board																			30,381 14	
Fish Culture				4,709 25		7,733 44		64,065 17											4,709 25	
Oyster Culture				5,556 53		14,951 92		452 40											21,191 55	
Fisheries Research Board of Canada				45,753 39		5,445 46		43,533 73		15,902 66							89,214 32		214,523 00	
International Fisheries Commission (Halibut)																	25,075 97		25,075 97	
International Pacific Salmon Fisheries Commission																	41,607 00		41,607 00	
Grant to United Maritime Fishermen's Association				1,000 00		1,000 00		1,000 00											3,000 00	
Expenses re Puget Seal Skins																			3,000 00	
Harbour Seal Bounty				2,957 50		1,035 00		855 00											74,477 56	
International Pacific Salmon Fisheries Commission (Hell's Gate)																	2,920 00		7,767 50	
Fishing Bounty				75,249 00		9,596 80		21,220 00		53,864 80							22,594 48		22,594 48	
Miscellaneous Civil Service Gratuities								300 00									300 00		600 00	
Extension of educational work in co-operative producing and selling among fishermen				14,746 53		1,752 79		10,946 04		7,698 63							2,767 67		37,911 66	
War Appropriation Act, 1942—																				
Canned Lobster Control Scheme												3,070 29							3,070 29	
Wartime Fisheries Advisory Committee		23 50															23 50		23 50	
Japanese Fishing Vessels Disposal Committee																	21,410 21		21,410 21	
Damage Claims re Japanese Vessels																	90,369 89		90,369 89	
Subsidy re Fishing Vessels Construction in B.C.																	61,511 55		61,511 55	
Construction and Operation of long line Fishing Vessel—East Coast				193 70															193 70	
Minister's Salary and Car Allowance		12,000 00																	12,000 00	
Department Administration		133,964 04																	133,964 04	
(a) Special Account Halibut (Finance Dept.)		257,438 01		457,037 00		95,501 64		301,674 19		80,782 28		5,092 42		139 27		254 93		715,480 36		1,913,400 10
(a) Special Account Salmon (Finance Dept.)																	24,970 92		24,970 92	
(a) Special Account Hell's Gate (Finance Dept.)																	41,740 63		41,740 63	
(a) Special Account Research Board (Finance Dept.)																	22,594 50		22,594 50	
(b) British Ministry of Food—Salmon								809,040 94									3,141 42		3,141 42	
(b) British Ministry of Food—Herring																	20,555,802 26		20,555,802 26	
(c) Department of National Defence (Naval Services)																	2,262,849 76		3,071,890 70	
		257,438 01		457,037 00		95,501 64		1,110,715 13		80,782 28		5,092 42		139 27		254 93		67,000 00		67,000 00
																	23,693,579 85		25,700,540 53	

NOTE.—(a) Balances due by the United States and the Province of British Columbia at the close of 1942-43 on account of divisible expenses.
 (b) Purchases of Salmon and Herring for the British Government.
 (c) Cost of moving Experimental Station from Prince Rupert to Vancouver, B.C. recovered from the Naval Services.

EXPENDITURES BY THE DOMINION GOVERNMENT ON ACCOUNT OF FISHERIES SERVICE SINCE CONFEDERATION

—	Fish Inspection etc.	Fish Culture	Fisheries Research Board	Dev. D.S. Fish., etc.	Fishing Bounty	Sundry Services	Total
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
To 1940-41 (a)....	34,442,683 45	11,388,022 90	3,933,601 99	2,382,254 64	9,348,621 07	10,356,689 88	71,851,873 93
1941-42.....	750,996 22	175,952 43	221,458 93	29,427 68	150,959 60	475,691 95	1,813,486 81
1942-43.....	763,945 71	181,027 36	217,040 76	30,381 14	159,930 60	563,589 29	1,915,914 86
	35,957,625 38	11,745,002 69	4,372,101 68	2,442,063 46	9,668,511 27	11,395,971 12	75,581,275 60

(a) For details by fiscal years see Appendix No. 6 of the Departmental Report for 1940-41.

SUMMARY BY PROVINCES

General.....	\$ 6,428,339 97
Nova Scotia.....	20,624,502 52
Prince Edward Island.....	3,620,655 00
New Brunswick.....	10,732,204 03
Quebec.....	5,888,871 47
Ontario.....	4,207,589 12
Manitoba.....	1,816,514 96
Manitoba and North West Territories.....	24,771 76
North West Territories.....	71,242 18
Saskatchewan.....	580,086 15
Alberta.....	641,689 70
British Columbia.....	20,915,450 31
Yukon.....	29,358 43
	<u>\$ 75,581,275 60</u>

REVENUE COLLECTED BY THE DOMINION GOVERNMENT ON ACCOUNT OF THE FISHERIES SERVICE SINCE CONFEDERATION

—	Fishing Revenue and Fines and Fort.	Casual Revenue	Pelagic Sealing Revenue	Sundry Revenues	Total
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
To 1940-41 (a).....	5,787,534 83	247,622 11	1,757,411 34	5,149,693 32	12,942,261 60
1941-42.....	80,299 57	9,897 20	325,131 12	40,403 57	455,731 46
1942-43.....	82,906 87	7,717 42	212,131 35	17,276 70	320,032 34
	5,950,741 27	265,236 73	2,294,673 81	5,207,373 59	13,718,025 40

(a) For details by fiscal years see Appendix No. 6 of the Departmental Report for 1940-41.

SUMMARY BY PROVINCES

General.....	\$ 7,131,904 06
Nova Scotia.....	814,547 47
Prince Edward Island.....	191,833 03
New Brunswick.....	725,927 70
Quebec.....	358,874 31
Ontario.....	561,138 94
Manitoba.....	335,474 08
Manitoba and North West Territories.....	7,416 45
North West Territories.....	9,498 23
Hudson Bay District.....	1,191 88
Saskatchewan.....	95,152 41
Alberta.....	234,710 87
British Columbia.....	3,232,202 22
Yukon.....	18,153 75
	<u>\$ 13,718,025 40</u>

Zoo!

Zoo!

